

VN-Matrix® 325

SDI, HD-SDI & 3G-SDI Over IP Codec



Extron® Electronics
INTERFACING, SWITCHING AND CONTROL

Safety Instructions • English



This symbol is intended to alert the user of important operating and maintenance (servicing) instructions in the literature provided with the equipment.



This symbol is intended to alert the user of the presence of uninsulated dangerous voltage within the product's enclosure that may present a risk of electric shock.

Caution

Read Instructions • Read and understand all safety and operating instructions before using the equipment.

Retain Instructions • The safety instructions should be kept for future reference.

Follow Warnings • Follow all warnings and instructions marked on the equipment or in the user information.

Avoid Attachments • Do not use tools or attachments that are not recommended by the equipment manufacturer because they may be hazardous.

Consignes de Sécurité • Français



Ce symbole sert à avertir l'utilisateur que la documentation fournie avec le matériel contient des instructions importantes concernant l'exploitation et la maintenance (réparation).



Ce symbole sert à avertir l'utilisateur de la présence dans le boîtier de l'appareil de tensions dangereuses non isolées posant des risques d'électrocution.

Attention

Lire les instructions • Prendre connaissance de toutes les consignes de sécurité et d'exploitation avant d'utiliser le matériel.

Conservier les instructions • Ranger les consignes de sécurité afin de pouvoir les consulter à l'avenir.

Respecter les avertissements • Observer tous les avertissements et consignes marqués sur le matériel ou présentés dans la documentation utilisateur.

Eviter les pièces de fixation • Ne pas utiliser de pièces de fixation ni d'outils non recommandés par le fabricant du matériel car cela risquerait de poser certains dangers.

Sicherheitsanleitungen • Deutsch



Dieses Symbol soll dem Benutzer in der im Lieferumfang enthaltenen Dokumentation besonders wichtige Hinweise zur Bedienung und Wartung (Instandhaltung) geben.



Dieses Symbol soll den Benutzer darauf aufmerksam machen, daß im Inneren des Gehäuses dieses Produktes gefährliche Spannungen, die nicht isoliert sind und die einen elektrischen Schock verursachen können, herrschen.

Achtung

Lesen der Anleitungen • Bevor Sie das Gerät zum ersten Mal verwenden, sollten Sie alle Sicherheits- und Bedienungsanleitungen genau durchlesen und verstehen.

Aufbewahren der Anleitungen • Die Hinweise zur elektrischen Sicherheit des Produktes sollten Sie aufbewahren, damit Sie im Bedarfsfall darauf zurückgreifen können.

Befolgen der Warnhinweise • Befolgen Sie alle Warnhinweise und Anleitungen auf dem Gerät oder in der Benutzerdokumentation.

Keine Zusatzgeräte • Verwenden Sie keine Werkzeuge oder Zusatzgeräte, die nicht ausdrücklich vom Hersteller empfohlen wurden, da diese eine Gefahrenquelle darstellen können.

Instrucciones de seguridad • Español



Este símbolo se utiliza para advertir al usuario sobre instrucciones importantes de operación y mantenimiento (o cambio de partes) que se desean destacar en el contenido de la documentación suministrada con los equipos.



Este símbolo se utiliza para advertir al usuario sobre la presencia de elementos con voltaje peligroso sin protección aislante, que puedan encontrarse dentro de la caja o alojamiento del producto, y que puedan representar riesgo de electrocución.

Precaucion

Leer las instrucciones • Leer y analizar todas las instrucciones de operación y seguridad, antes de usar el equipo.

Conservar las instrucciones • Conservar las instrucciones de seguridad para futura consulta.

Obedecer las advertencias • Todas las advertencias e instrucciones marcadas en el equipo o en la documentación del usuario, deben ser obedecidas.

Evitar el uso de accesorios • No usar herramientas o accesorios que no sean específicamente recomendados por el fabricante, ya que podrían implicar riesgos.

安全须知 • 中文



这个符号提示用户该设备用户手册中有重要的操作和维护说明。



这个符号警告用户该设备机壳内有暴露的危险电压，有触电危险。

注意

阅读说明书 • 用户使用该设备前必须阅读并理解所有安全和使用说明。

保存说明书 • 用户应保存安全说明书以备将来使用。

遵守警告 • 用户应遵守产品和用户指南上的所有安全和操作说明。

避免追加 • 不要使用该产品厂商没有推荐的工具或追加设备，以避免危险。

Warning

Power sources • This equipment should be operated only from the power source indicated on the product. This equipment is intended to be used with a main power system with a grounded (neutral) conductor. The third (grounding) pin is a safety feature, do not attempt to bypass or disable it.

Power disconnection • To remove power from the equipment safely, remove all power cords from the rear of the equipment, or the desktop power module (if detachable), or from the power source receptacle (wall plug).

Power cord protection • Power cords should be routed so that they are not likely to be stepped on or pinched by items placed upon or against them.

Servicing • Refer all servicing to qualified service personnel. There are no user-serviceable parts inside. To prevent the risk of shock, do not attempt to service this equipment yourself because opening or removing covers may expose you to dangerous voltage or other hazards.

Slots and openings • If the equipment has slots or holes in the enclosure, these are provided to prevent overheating of sensitive components inside. These openings must never be blocked by other objects.

Lithium battery • There is a danger of explosion if battery is incorrectly replaced. Replace it only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Avertissement

Alimentations • Ne faire fonctionner ce matériel qu'avec la source d'alimentation indiquée sur l'appareil. Ce matériel doit être utilisé avec une alimentation principale comportant un fil de terre (neutre). Le troisième contact (de mise à la terre) constitue un dispositif de sécurité : n'essayez pas de la contourner ni de la désactiver.

Déconnexion de l'alimentation • Pour mettre le matériel hors tension sans danger, déconnectez tous les cordons d'alimentation de l'arrière de l'appareil ou du module d'alimentation de bureau (s'il est amovible) ou encore de la prise secteur.

Protection du cordon d'alimentation • Acheminer les cordons d'alimentation de manière à ce que personne ne risque de marcher dessus et à ce qu'ils ne soient pas écrasés ou pincés par des objets.

Réparation-maintenance • Faire exécuter toutes les interventions de réparation-maintenance par un technicien qualifié. Aucun des éléments internes ne peut être réparé par l'utilisateur. Afin d'éviter tout danger d'électrocution, l'utilisateur ne doit pas essayer de procéder lui-même à ces opérations car l'ouverture ou le retrait des couvercles risquent de l'exposer à de hautes tensions et autres dangers.

Fentes et orifices • Si le boîtier de l'appareil comporte des fentes ou des orifices, ceux-ci servent à empêcher les composants internes sensibles de surchauffer. Ces ouvertures ne doivent jamais être bloquées par des objets.

Lithium Batterie • Il a danger d'explosion s'il y a un remplacement incorrect de la batterie. Remplacer uniquement avec une batterie du même type ou d'un ype équivalent recommandée par le constructeur. Mettre au reut les batteries usagées conformément aux instructions du fabricant.

Vorsicht

Stromquellen • Dieses Gerät sollte nur über die auf dem Produkt angegebene Stromquelle betrieben werden.

Dieses Gerät wurde für eine Verwendung mit einer Hauptstromleitung mit einem geerdeten (neutralen) Leiter konzipiert. Der dritte Kontakt ist für einen Erdschluß, und stellt eine Sicherheitsfunktion dar. Diese sollte nicht umgangen oder außer Betrieb gesetzt werden.

Stromunterbrechung • Um das Gerät auf sichere Weise vom Netz zu trennen, sollten Sie alle Netzkabel aus der Rückseite des Gerätes, aus der externen Stromversorgung (falls dies möglich ist) oder aus der Wandsteckdose ziehen.

Schutz des Netzkabels • Netzkabel sollten stets so verlegt werden, daß sie nicht im Weg liegen und niemand darauf treten kann oder Objekte darauf- oder unmittelbar dagegengestellt werden können.

Wartung • Alle Wartungsmaßnahmen sollten nur von qualifiziertem Servicepersonal durchgeführt werden.

Die internen Komponenten des Gerätes sind wartungsfrei. Zur Vermeidung eines elektrischen Schocks versuchen Sie in keinem Fall, dieses Gerät selbst öffnen, da beim Entfernen der Abdeckungen die Gefahr eines elektrischen Schlags und/oder andere Gefahren bestehen.

Schlitze und Öffnungen • Wenn das Gerät Schlitze oder Löcher im Gehäuse aufweist, dienen diese zur Vermeidung einer Überhitzung der empfindlichen Teile im Inneren. Diese Öffnungen dürfen niemals von anderen Objekten blockiert werden.

Litium-Batterie • Explosionsgefahr, falls die Batterie nicht richtig ersetzt wird. Ersetzen Sie verbrauchte Batterien nur durch den gleichen oder einen vergleichbaren Batterieüty, der auch vom Hersteller empfohlen wird. Entsorgen Sie verbrauchte Batterien bitte gemäß den Herstelleranweisungen.

Advertencia

Alimentación eléctrica • Este equipo debe conectarse únicamente a la fuente/tipo de alimentación eléctrica indicada en el mismo. La alimentación eléctrica de este equipo debe provenir de un sistema de distribución general con conductor neutro a tierra. La tercera pata (puesta a tierra) es una medida de seguridad, no puentearia ni eliminaria.

Desconexión de alimentación eléctrica • Para desconectar con seguridad la acometida de alimentación eléctrica al equipo, desenchufar todos los cables de alimentación en el panel trasero del equipo, o desenchufar el módulo de alimentación (si fuera independiente), o desenchufar el cable del receptáculo de la pared.

Protección del cables de alimentación • Los cables de alimentación eléctrica se deben instalar en lugares donde no sean pisados ni apretados por objetos que se puedan apoyar sobre ellos.

Reparaciones/mantenimiento • Solicitar siempre los servicios técnicos de personal calificado. En el interior no hay partes a las que el usuario deba acceder. Para evitar riesgo de electrocución, no intentar personalmente la reparación/mantenimiento de este equipo, ya que al abrir o extraer las tapas puede quedar expuesto a voltajes peligrosos u otros riesgos.

Ranuras y aberturas • Si el equipo posee ranuras o orificios en su caja/alojamiento, es para evitar el sobrecalentamiento de componentes internos sensibles. Estas aberturas nunca se deben obstruir con otros objetos.

Batería de litio • Existe riesgo de explosión si esta batería se coloca en la posición incorrecta. Cambiar esta batería únicamente con el mismo tipo (o su equivalente) recomendado por el fabricante. Desachar las baterías usadas siguiendo las instrucciones del fabricante.

警告

电源 • 该设备只能使用产品上标明的电源。设备必须使用有地线的供电系统供电。 第三条线（地线）是安全设施，不能不用或跳过。

拔掉电源 • 为安全地从设备拔掉电源，请拔掉所有设备后或桌面电源的电源线，或任何接到市电系统的电源线。

电源线保护 • 妥善布线， 避免被踩踏，或重物挤压。

维护 • 所有维修必须由认证的维修人员进行。 设备内部没有用户可以更换的零件。为避免出现触电危险不要自己试图打开设备盖子维修该设备。

通风孔 • 有些设备机壳上有通风槽或孔，它们是用来防止机内敏感元件过热。 不要用任何东西挡住通风孔。

锂电池 • 不正确的更换电池会有爆炸的危险。必须使用与厂家推荐的相同或相近型号的电池。按照生产厂的建议处理废弃电池。

FCC Class A Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. Operation is subject to the following two conditions:
This device may not cause harmful interference.

1. This device must accept any interference received, including interference that may cause undesired operation.

The Class A limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

NOTE: This unit was tested with shielded cables on the peripheral devices. Shielded cables must be used with the unit to ensure compliance with FCC emissions limits.
For more information on safety guidelines, regulatory compliances, EMI/EMF compliance, accessibility, and related topics, [click here](#).

Conventions Used in this Guide

In this user guide, the following are used:

CAUTION: A caution indicates a potential hazard to equipment or data.

NOTE: A note draws attention to important information.

TIP: A tip provides a suggestion to make working with the application easier.

WARNING: A warning warns of things or actions that might cause injury, death, or other severe consequences.

NOTE: For examples of computer or device responses mentioned in this guide, the character "Ø" is used for the number zero and "O" represents the capital letter "o."

Directory paths that do not have variables are written in the font shown here:

C:\Program Files\Extron

Variables are written in slanted form as shown here:

ping xxx.xxx.xxx.xxx -t

SOH R *Data* STX *Command* ETB ETX

Selectable items, such as menu names, menu options, buttons, tabs, and field names are written in the font shown here:

From the **File** menu, select **New**.

Click the **OK** button.

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Introduction

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About this Guide

This guide contains installation, configuration, and operating information for the Extron® VN-Matrix® VNC 325 encoder/decoders (codecs).

NOTE: This guide describes the operation the VN-Matrix 325 with version 4.6 or later firmware.

About the VNC 325 Codec

The VN-Matrix VNC 325 video codecs (see [figure 1](#)) distribute digital SD, HD-SDI, or 3G-SDI broadcast quality video and audio content across an IP network using the Extron PURE3® Codec algorithm. PURE3 exceeds many of the performance characteristics of existing compression formats and provides exceptionally robust protection against network errors, making it ideal for quality-critical applications. The VNC 325 codec can be configured to operate in one of two modes:

- As an encoder to encode a source and stream it across a network,
- As a decoder to decode a VN-Matrix 325 encoded data stream from a network.

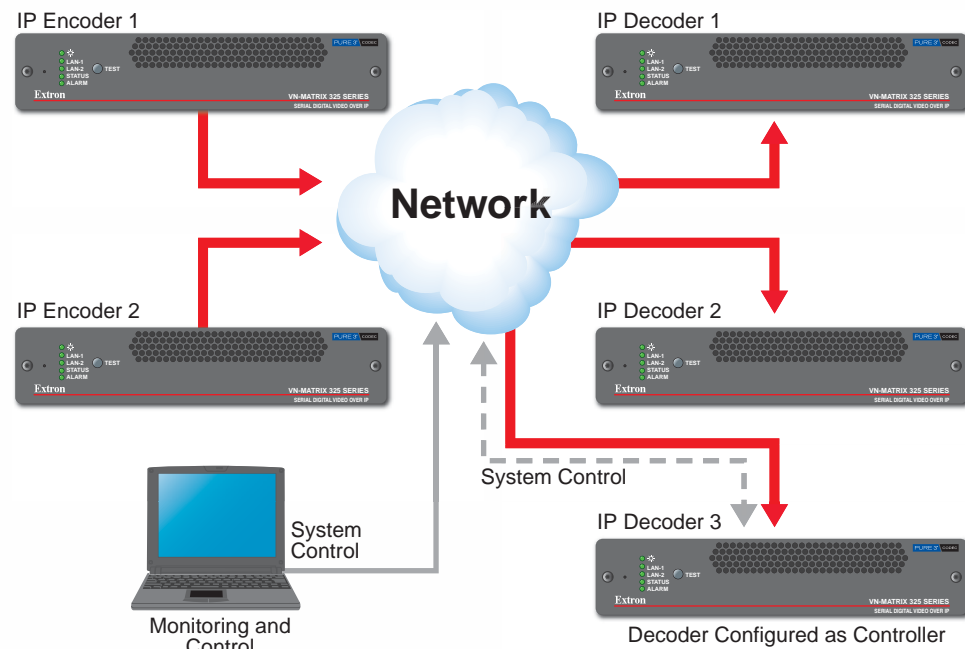


Figure 1. Typical VN-Matrix 325 Application

Each VNC 325 codec has an integrated web interface. One codec in the VN-Matrix system must be designated as the system controller, and the controller can be any unit in the system, whether it is configured as an encoder or decoder. All normal system configuration and control is via the web interface of the designated controller. Using a computer on the same network and a standard web browser, such as Mozilla® Firefox® or Microsoft® Internet Explorer®, you can configure any VNC 325 unit in the system.

Video signals that are connected to a VNC 325 codec that is configured as an encoder are compressed into a data stream for transport across a local area or wide area network. At the far end of the network, one or more VNC 325 codecs configured as decoders decode the compressed stream back into the original video signal format.

The VNC 325 that is configured as an encoder accepts audio that is embedded in the input video and that complies with the following SMPTE standards:

- **SMPTE 299M** — 24-bit digital audio
- **SMPTE 272M-A** — 20-bit digital audio

The embedded audio groups can be transported with the associated video content. Audio can be sent as received (transparent mode) or as a single stereo pair (stereo mode). Stereo mode results in a lower bit rate and reduces the network load. The VN-Matrix system also supports simple compression of the stereo audio.

A dedicated RS-232 port is available for distributing RS-232 data with the coded/decoded video, such as for control of projector.

A VN-Matrix 325 system is comprised of at least two devices, one configured as an encoder and the other as a decoder. However, multiple encoders and decoders can co-exist on the same network. On a given network, any decoder can display the source provided by any encoder. **Figure 1**, on the preceding page, shows a basic VN-Matrix 325 system. In this example, either of the two encoder streams can be routed to any or all three decoder units. The configuration of each device, including the source that is displayed at each destination, can be set using any PC or laptop on the same network, using the VN-Matrix 325 web pages. In this example, the codec that is labeled IP Decoder 3 is the system controller.

Source (digital video) data from a VNC 325 encoder can be distributed to multiple decoders and displays (one-to-many) or to a single decoder and display (point-to-point). Video data is transported from the source (encoder) to the display (decoder) using one of three methods:

- **Multicast real time protocol (RTP)** — One source (encoder) and an infinite number of displays (decoders)
- **Unicast RTP** — Single source (encoder) to single display (decoder), but it can also be used for up to four displays
- **Unicast transport control protocol (TCP)** — Single source (encoder) to single display (decoder). This method should be used **only** for single point-to-point transfer of data.

Each method, with its advantages and disadvantages and a sample connection diagram, is described in “**Data Transport Methods**” in the “Installation” section.

The units are housed in 1U high metal enclosures that can be mounted in any standard 19-inch rack or under furniture with optional mounting kits.

The external 100 VAC to 240 VAC, 50-60 Hz power supply provides worldwide power compatibility.

Features

Supports broadcast quality video formats (see [table 1](#))

Table 1. Supported Video Formats

	Video Format		
	SMPTE 424 / 425M	SMPTE 292M	SMPTE 259M
Resolutions	1080p @ 50/59.94/60 Hz	1080i @ 50/59.95/60 Hz 1080p@23.97/24/25/29.97/30 Hz 720p @ 23.97/24/25/29.97/30/50/59.94/60 Hz	525i @ 59.94 Hz 625i @ 50 Hz
Color space	10-bit, 4:2:2, YCrCb	10-bit, 4:2:2, YCrCb	10-bit, 4:2:2, YCrCb

Autodetection — The codecs auto-detect the format of the connected signal. Input sources are encoded and decoded at their native resolution and format

Audio signal compatability — The codecs support the transport of embedded audio input data, as described by the SMPTE 299M 24-bit digital audio and SMPTE 272M-A 20-bit digital audio standards.

Configurable as encoder and decoder —

Encoder signal connections — The unit has three functional BNC connectors for video connections; an input and two looped outputs.

Decoder signal connections — The unit has two functional BNC connectors for video and sync connections.

Two levels of operator interface —

Low-level configuration — The Ethernet parameters of each codec in the system are set using a PC connected to an RS-232 serial port.

Final configuration and operation — After the initial low-level configuration, all other configuration and operation of the VN-Matrix 325 system is via either of two Ethernet ports of the system controller unit. A computer that is running on the same network as either port can control the entire system using the built-in HTML pages of that unit.

System control — One codec unit in the system is designated as the system controller. The unit acts as a server for the HTML control interface and holds a record of the configuration of all VN-Matrix 325 devices on the network. The system controller manages the communications to all VNC 325 devices. Any codec, whether it is configured as an encoder or decoder, can be used as the system controller.

Two Ethernet ports — Each unit has two Ethernet ports for network connections:

One RJ-45 port for a Category (CAT) 6 twisted pair (TP) cable

One optical port for a fiber-optic cable

Two RS-232 serial ports —

Remote port — For low-level configuration of the Ethernet parameters of the unit.

RS-232 Over LAN port — For inputting and outputting RS-232 data with the coded and decoded video, such as for control of projector. This port is also for access to the built-in alarm relay.

Highly efficient compression algorithms — The VN-Matrix 325 system uses a minimal amount of data to transport video and audio across the network.

NOTE: It is crucial to the effective operation of VN-Matrix 325 that sufficient data throughput be achieved, especially where multiple sources are encoded. The network efficiency is directly affected by the speed and configuration of each element, such as switchers and routers, within its infrastructure. The VN-Matrix 325 system achieves optimum transmission results over a dedicated 1 Gbps network (1000Base-T, also known as Gigabit Ethernet).

Rack mounting — One or two 1U high, half-rack metal enclosure units can be mounted in any standard 19-inch rack with optional mounting kits.

Under furniture mounting — Using optional Extron surface mount kit

Power — The external 100 VAC to 240 VAC, 50-60 Hz power supply provides worldwide power compatibility.

Installation and Setup

This section details the installation and initial configuration of the VN-Matrix VNC 325 codecs, including:

- **Installation and Setup Overview**
- **Rear Panel Features**
- **Mounting the Units**
- **Planning the System Architecture**
- **Configuring Network Settings**
- **Making Remaining Connection**
- **Configuring Encoders and Decoders**

Installation and Setup Overview

This section introduces a checklist of the actions that you should do in the order shown to install and configure all of the VNC 325 codecs in the VNM 325 system and to start streaming data.

NOTE: For best results, and to avoid network disruption, install and setup the system in the order shown below.

- ☐ Familiarize yourself with the signal and power connections on the codec (see "**Rear Panel Features**").
- ☐ If desired, mount the units (see "**Mounting the Units**").
- ☐ Determine the data transport method and system routing that you will use in your system (see "**Planning the System Architecture**").
- ☐ Use a computer connected to the Remote port on each unit to configure the network settings for that unit. Set one encoder in the system as the controller. See "**Configuring Network Settings**".
- ☐ Make all remaining connections, including LAN connections, one or more sources, and all displays (see "**Making Remaining Connections**").
- ☐ Use a web browser and the network interface to configure the system for the data transport method selected (see "**Configuring Encoders and Decoders**").

Rear Panel Features

NOTE: This “Rear Panel Features” section identifies the various ports on the back of the VNC 325 and defines their function. Do **NOT** make any network (LAN) connections until directed in the connection and setup procedures that begin after this section.

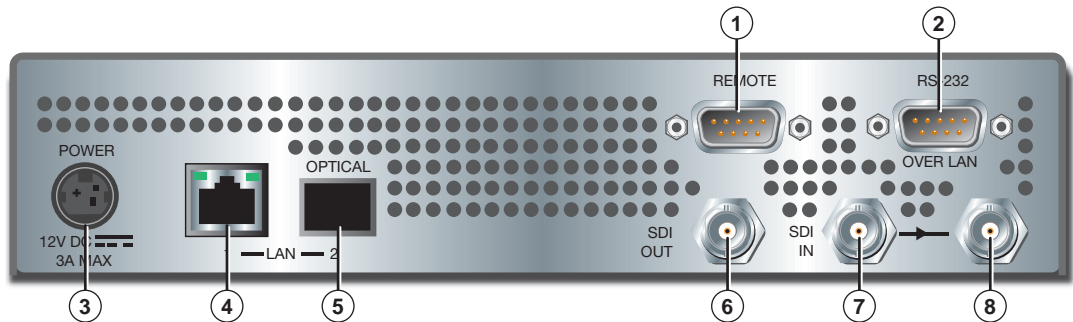


Figure 2. VNC 325 Features

NOTE: The VNC 325 uses male connectors for the serial ports (① and ②). You may need an adapter.

- ① **Remote port** — Use this male 9-pin port on each VNC 325 to perform low level configuration of that unit **only**.

NOTE See “**Serial Port Wiring**” on page 16 for the detailed serial port protocol and to wire this connector.

- ② **RS-232 Over LAN port** — Use this male 9-pin port to transmit and receive data across a network.

NOTE: The RS-232 Over LAN port also connects to the alarm relay in the codec. The relay energizes whenever a critical alarm condition occurs (see “**RS-232 Over LAN Port**” on page 21 to wire the connector and “**Filter settings panel**” on page 60 to set critical alarms).

- ③ **Power Connector** — Connect the included 12 V power supply between this connector and a 100 VAC/240 VAC, 50-60 Hz source.

CAUTIONS:

- Always use power supplies specified by Extron for the codec. Use of an unauthorized power supply voids all regulatory compliance certification and may cause damage to the supply and the unit.
- This unit is intended to be supplied by a Listed Power Unit marked “Class 2” or “LPS,” rated 12 VDC, 1.0 A minimum. Always use a power supply supplied by or specified by Extron. Use of an unauthorized supply voids all regulatory compliance certification and may cause damage to the supply and the end product.
- Unless otherwise stated, the AC/DC adapters are not suitable for use in air handling spaces or in wall cavities. The installation must always be in accordance with the applicable provisions of National Electrical Code ANSI/NFPA 70, article 75 and the Canadian Electrical Code part 1, section 16. The power supply shall not be permanently fixed to a building structure or similar structure.

- ④ **LAN port 1 (RJ-45 port)** — Use either this port or the fiber optic network port (⑤) to stream video and audio data across a network, to control the VN-Matrix system, or both.
- ⑤ **LAN port 2 (fiber optic port)** — Use either this port or the RJ-45 network port (④) to stream video and audio data across a network, to control the VN-Matrix system, or both.

NOTES:

- Do **NOT** connect VN-Matrix units to an existing network until each is correctly configured. Incorrect configuration may cause disruption to other network users.
- See “**RJ-45 port wiring**” on page 22 to make a cable for LAN port 1 (④).
- See “**Configuring Network Settings**” on page 16 to configure the units.
- Extron does not supply the plug-in SFP module for the optical Network port.

- ⑥ **SDI Out BNC connector** —

NOTE: See “**Video Input, Output, and Loop Connections**” for detailed connection diagrams.

Encoder configuration — This connector provides a loop through of the original source with or without an optional text overlay.

Decoder configuration — Connect an SDI, HD-SDI, or 3G-SDI digital video display to receive the streamed digital video output.

- ⑦ **SDI In BNC connector** —

NOTE: See “**Video Input, Output, and Loop Connections**” on page 23 for detailed connection diagrams.

Encoder configuration — Connect an SDI, HD-SDI, or 3G-SDI digital video input for encoding and streaming to one or more decoders.

Decoder configuration — If desired, connect a local SDI input or genlock signal of the same resolution and refresh rate to synchronize the decoder to a local standard.

- ⑧ **Loop BNC connector** —

Encoder configuration — This connector provides a buffered loop through of the original source.

Decoder configuration — **Not used.**

Mounting the Units

CAUTIONS:

- Installation and service must be performed by authorized personnel only.
- Ensure the vents in front and rear of the equipment case are not covered.

Detailed mounting instructions are in the “**Reference Information**” section. The 1U high, half-rack width VNC 325 codecs can be placed on a tabletop, without additional kits or mounted on a rack shelf or mounted under a desk, using the optional applicable mounting kit.

Planning the System Architecture

Before you make connections, plan how you will transport data (see “**Data Transport Methods**”, below) and how you will route the streaming video and audio and the control signals within the network (see “**Data and Control Routing**,” on page 10).

Data Transport Methods

Source (video) data from a VNC 325 encoder can be distributed to multiple decoders and displays (one-to-many) or to a single decoder and display (point-to-point). Video data is transported from the source (encoder) to the display (decoder) using one of three methods, in order of preference, which are detailed in the following sections:

- **Multicast real-time protocol (RTP)** — Best choice
- **Unicast RTP** — Second choice
- **Unicast Transport Control Protocol (TCP)** — Acceptable

You need to select among these three methods using the HTML pages, see “**Configure Encoders or Decoders**” on page 25.

Multicast RTP

The multicast real-time protocol (RTP) data transport method is connected as shown in figure 3. Multicast RTP is a one-to-many protocol that allows a source to be displayed on an infinite number of displays. This transport method uses a real-time variation of User Datagram Protocol (UDP), called RTP. In figure 3, the streaming data is identified as “RTPm”.

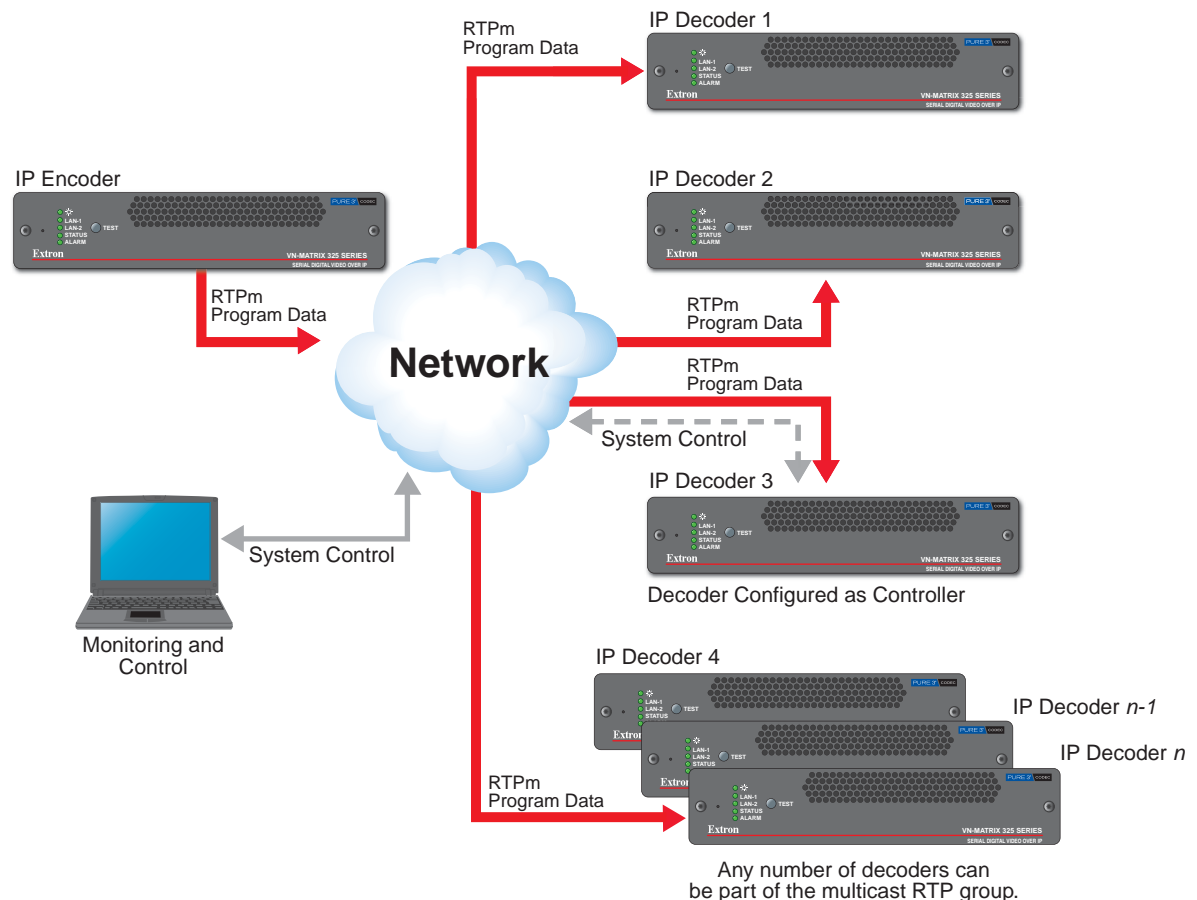


Figure 3. Typical Multicast RTP Application

- NOTES:**
- The UDP protocol is a standard Internet network protocol that is connection-less, meaning that it does not use the hand-shaking that provide reliability, ordering, or data integrity but is overhead intensive. Therefore, UDP can be unreliable. On the other hand, RTP provides very low latency, which is important for video transport.
 - The VN-Matrix 325 supports IGMP V2 for multicast streaming.

This is the recommended transport method for real time video and audio data over an IP network. However, because RTP is a connection-less protocol, data delivery is not guaranteed. Where data packets are lost (such as due to excessive network traffic), the PURE3 algorithm carefully manages the data stream to minimize any image disruption.

NOTE: In figure 3, IP decoder 3 is designated as the system controller.

Unicast RTP

Like multicast RTP, the unicast RTP data transport method uses a real-time variation of the UDP protocol that is connected as shown in figure 4. Unicast RTP differs from multicast RTP in that it is a point-to-point protocol that uses a separate data stream for each decoded display. The VN-Matrix 325 system can support up to four displays (decoders) from one source (encoder), but such a configuration uses four separate data streams and results in four times the network bit rate as a single display (decoder) configuration.

This method can be used in place of multicast RTP, when the network infrastructure does not support or the local IT administration will not allow multicast traffic. Contact the system administrator.

In figure 4, the four streams of data are identified as “RTP1” through “RTP4”.

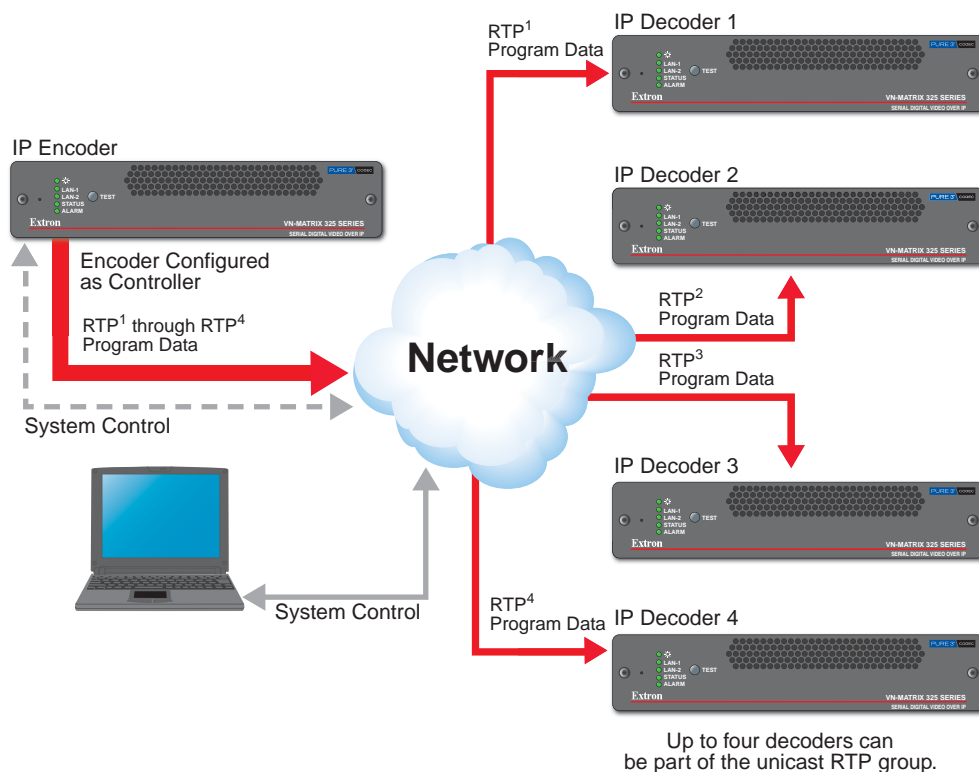


Figure 4. Typical Unicast RTP Application

As with multicast RTP, it is a connection-less protocol and data delivery is not guaranteed. Where data packets are lost (such as due to excessive network traffic), the PURE3 algorithm carefully manages the data stream to minimize any image disruption.

NOTES:

- In figure 4, the IP encoder is designated as the system controller.
- In unicast RTP mode, while the system supports up to 4 simultaneous streams, the rate is dependant on the total aggregated bit rate, which must not exceed 270 Mbs.

Unicast TCP

The unicast TCP data transport method uses standard TCP protocol and should be used for single point-to-point transfer of data **only**. This method is connected as shown in **figure 5**.

- NOTES:**
- Multiple decoder connections are theoretically possible using this method but **not** recommended. Each additional connection creates extra loading on the encoder CPU, which ultimately results in poor display performance. In addition, multiple TCP streams carrying the same source data is an inefficient use of network bandwidth.
 - While figure 5 shows two decoders, in the scenario shown only IP decoder 1 is set to actively decode data that is streamed to it. IP decoder 2 may be in standby (set as **Device Type: None**, see “**Configure Encoders or Decoders**”) or may be receiving streamed data from another encoder.
 - In figure 5, IP decoder 2 is designated as the system controller.

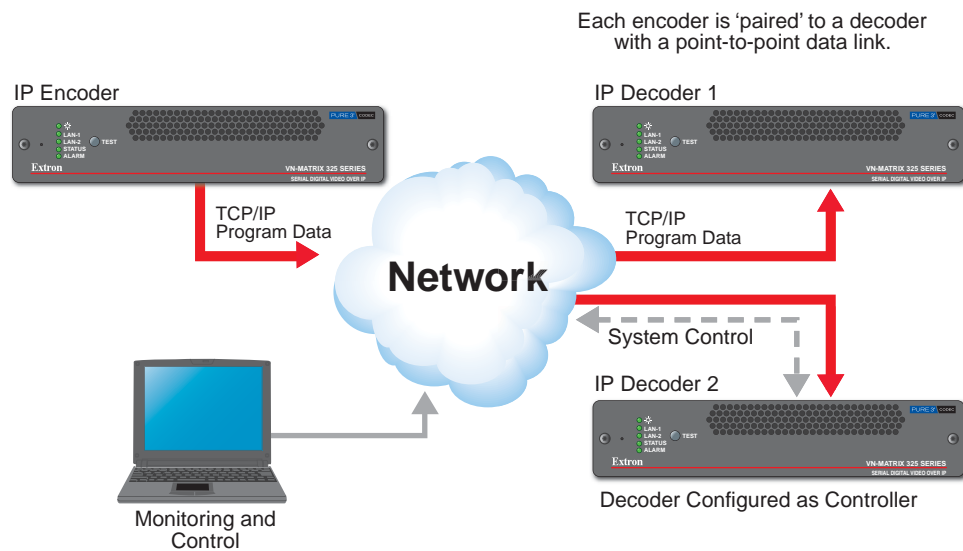


Figure 5. Typical Unicast TCP Application

TCP is a connection-based protocol. Data is guaranteed to be delivered, however excessive network traffic, which impacts real-time performance, may delay delivery.

Data and Control Routing

The system can be used over both switched (single segment) and routed (multi-segment) networks

The VN-Matrix 325 system can be configured to run using either a single LAN port (1 or 2) or both LAN ports. In the single port configuration, all data (image, audio, control, and monitoring) is transported on the designated port. In the dual port configuration, image and audio data is transported on one connection while the other LAN port is used for monitoring and or management functions.

All system control is managed by the VNC 325 that has been designated as the controller. Any changes made in the network browser are sent to the affected codec from the controller via the network that has been assigned for streaming. The browser is accessible via either network port on the unit that is configured as the controller.

Video and audio data can be transported over either of the LAN ports on the VNC 325 and are independent of the system control data.

Example 1: Switched and isolated network configuration

NOTE: It is immaterial, in this example, which codec is the encoder and which is the decoder. These functions are not identified in figure 6.

Figure 6 shows two VNC 325 codecs that are configured to work across two switched and isolated networks. Codec 1 is configured as the controller, via LAN port 1. The controller handles all normal system configuration and control via its web interface.

This example consists of two networks, connected to the VN-Matrix system as follows:

- **Network 1, connected to LAN port 1 (RJ-45 port), the “green” network** — The encoder streams video on this network and it is also used for system control and monitoring.

NOTE: Selection of this network for streaming is via the built-in HTML network interface. This selection is defined in the management interface, described later (see “[Configure Encoders or Decoders](#)”).

- **Network 2, connected to LAN port 2 (the fiber optic port), the “red” network** — This network is separated from the streaming network. This network also can be used for system control and monitoring if preferred.

NOTE: The controller codec responds to inquiries on LAN port 2 as well as LAN port 1.

- A network management server can also be integrated if required.

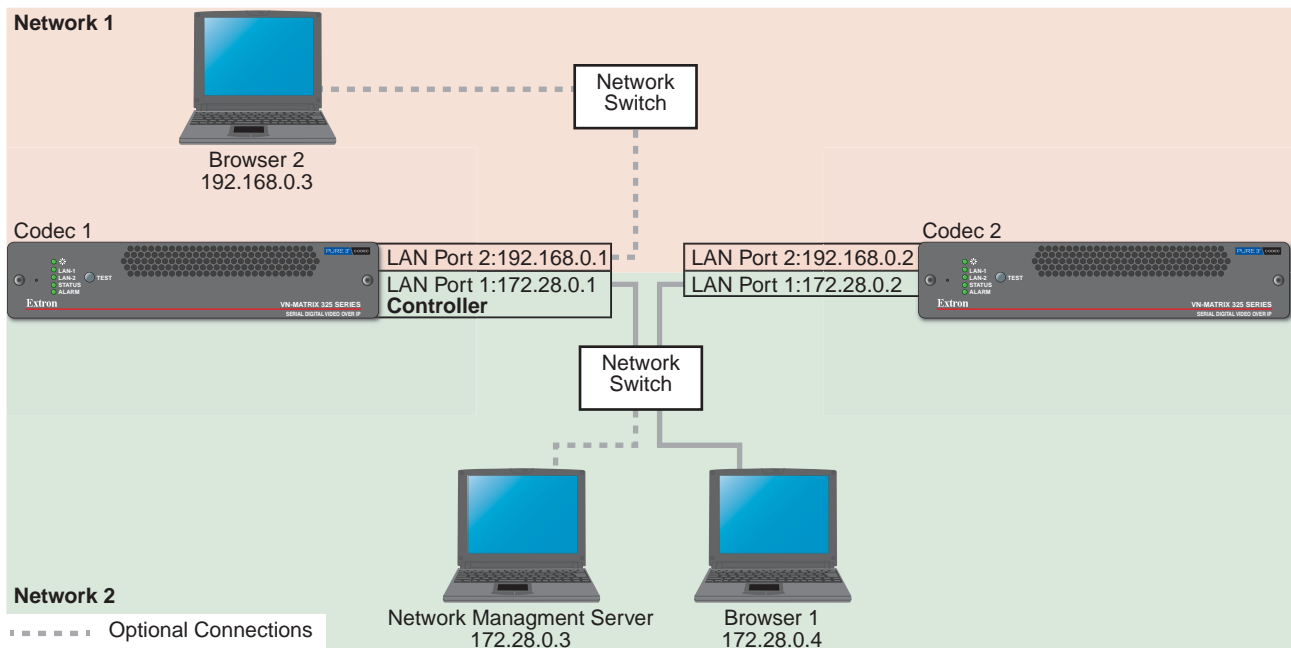


Figure 6. Switched and Isolated Network Configuration

Table 2 shows the codec configuration settings for example 1. See “**Configure Network Settings**” on page 16 to make these settings.

NOTE: A gateway value must be set on the streaming port otherwise no streaming status is available in the HTML network interface.

Table 2. Applicable Codec Configuration Selections

Codec 1			
Option	LAN Port 1 (RJ-45)	Option	LAN Port 2 (fiber optic)
2	Address: 172.28.0.1	12	Address: 192.168.0.1
3	Netmask: 255.255.0.0	13	Netmask: 255.255.255.0
4	Gateway: 172.28.0.254	14	
7	Controller ip: 172.28.0.1		

Codec 2			
Option	LAN Port 1 (RJ-45)	Option	LAN Port 2 (fiber optic)
2	Address: 172.28.0.2	12	Address: 192.168.0.2
3	Netmask: 255.255.0.0	13	Netmask: 255.255.255.0
4	Gateway: 172.28.0.254	14	
7	Controller ip: 172.28.0.1		

Example 2: Switched and isolated network configuration

NOTE: It is immaterial, in this example, which codec is the encoder and which is the decoder. These functions are not identified in figure 7.

Figure 7 shows two VNC 325 codecs that are configured to work across two switched and isolated networks. Codec 1 is configured as the controller, via LAN port 2.

This example consists of two networks, connected to the VN-Matrix system as follows:

- **Network 1, connected to LAN port 1 (RJ-45 port), the “green” network** — This network is separated from the streaming network. This network also can be used for system control and monitoring if preferred.

NOTE: The controller codec responds to inquiries on LAN port 1 as well as LAN port 2.

- **Network 2, connected to LAN port 2 (the fiber optic port), the “red” network** — The encoder streams video on this network and it is also used for system control and monitoring.

NOTE: Selection of this network for streaming is via the built-in HTML network interface. This selection is defined in the management interface, described later (see “**Configure Encoders or Decoders**”).

- A network management server can also be integrated if required.

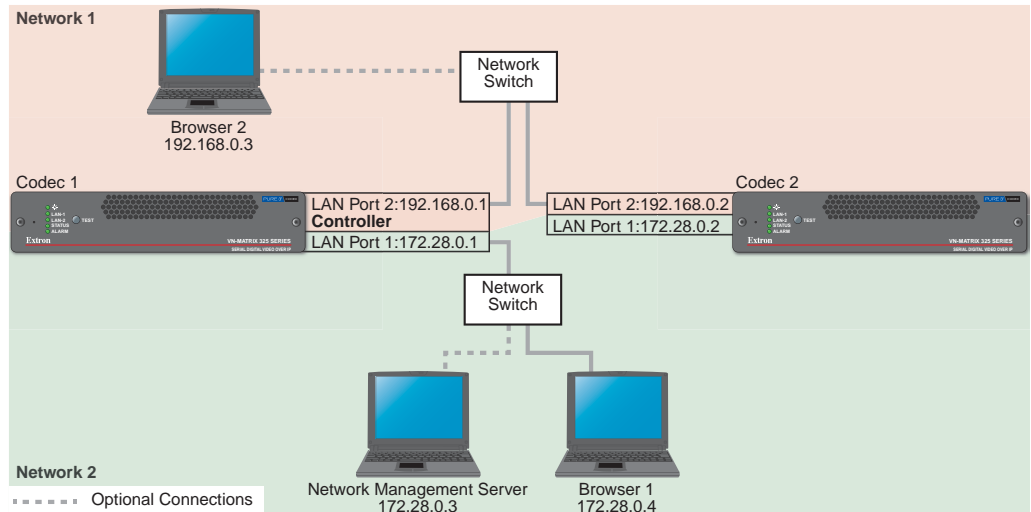


Figure 7. Switched and Isolated Network Configuration

Table 3 shows the codec configuration settings for example 2. See “**Configure Network Settings**” on page 16 to make these settings.

NOTE: A gateway value must be set on the streaming port otherwise no streaming status is available in the HTML network interface.

Table 3. Applicable Codec Configuration Selections

Codec 1			
Option	LAN Port 1 (RJ-45)	Option	LAN Port 2 (fiber optic)
2	Address: 172.28.0.1	12	Address: 192.168.0.1
3	Netmask: 255.255.0.0	13	Netmask: 255.255.255.0
4		14	Gateway: 192.168.0.254
		17	Controller ip: 192.168.0.1

Codec 2			
Option	LAN Port 1 (RJ-45)	Option	LAN Port 2 (fiber optic)
2	Address: 172.28.0.2	12	Address: 192.168.0.2
3	Netmask: 255.255.0.0	13	Netmask: 255.255.255.0
4		14	Gateway: 192.168.0.254
		17	Controller ip: 192.168.0.1

Example 3: Routed Network Configuration

NOTE: It is immaterial, in this example, which codec is the encoder and which is the decoder. These functions are not identified in figure 8.

Figure 8 shows an example of a routed network configuration. Codec 1 is configured as the controller, via LAN port 2.

- The two codecs are connected across a wide area network (WAN) via an external router.
- **Network 1, connected to LAN port 1 (RJ-45 port), the “green” network** — This network is separated from the streaming network. This is the primary network for system control and monitoring.
- **Network 2, connected to LAN port 2 (the fiber optic port), the “red” network** — The encoder streams video on this network and it can also be used for system control and monitoring if desired.

NOTE: Selection of this network for streaming is via the built-in HTML network interface. This selection is defined in the management interface, described later (see “**Configure Encoders or Decoders**”).

- The gateway IP addresses (the addresses on both sides of the router on the red network) is set on LAN port 2 (configuration option 14) for both codecs.
- This architecture provides isolation between the video transport and simple network management protocol (SNMP) traffic.

NOTE: The SNMP protocol includes a system of SNMP trap messages. SNMP trap messages can be initiated by a network element and sent to the network management system.

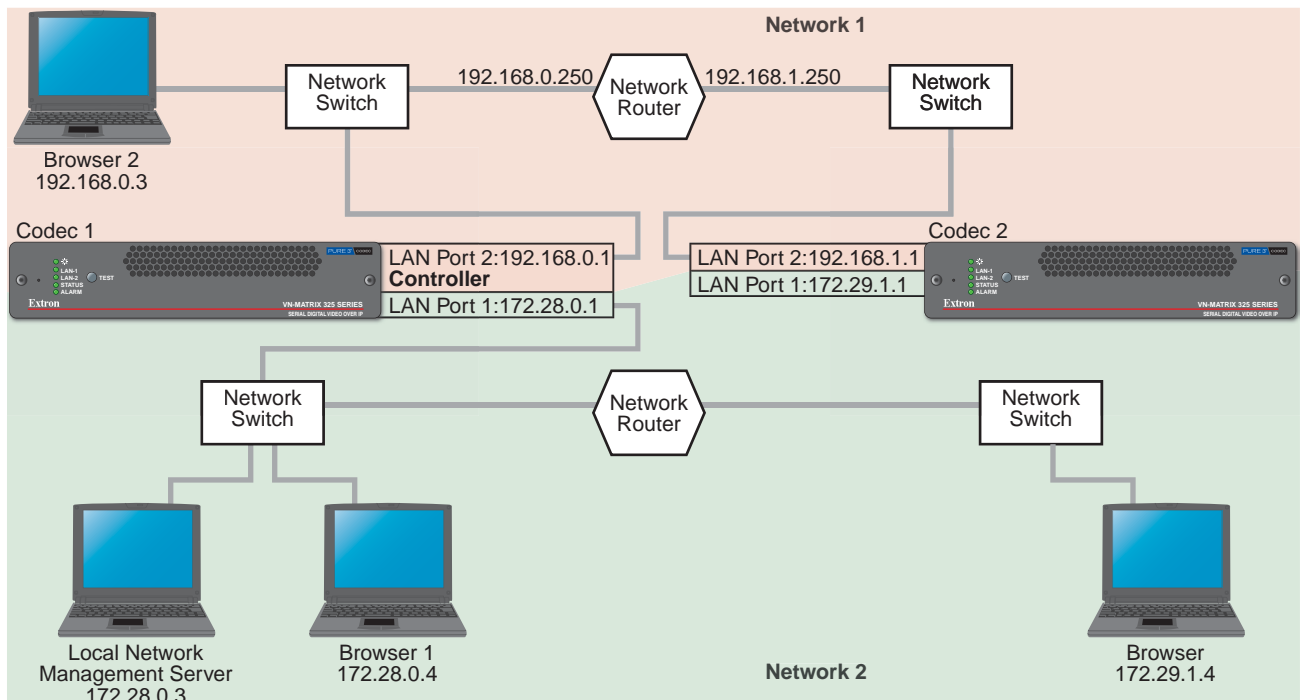


Figure 8. Routed Network Configuration

Table 4 shows the codec configuration settings for example 3. See “**Configure Network Settings**” on page 16 to make these settings.

Table 4. Applicable Codec Configuration Selections

Codec 1			
Option	LAN Port 1 (RJ-45)	Option	LAN Port 2 (fiber optic)
2	Address: 172.28.0.1	12	Address: 192.168.1.1
3	Netmask: 255.255.0.0	13	Netmask: 255.255.255.0
		14	Gateway: 192.168.0.250
		17	Controller ip: 192.168.1.1

Codec 2			
Option	LAN Port 1 (RJ-45)	Option	LAN Port 2 (fiber optic)
2	Address: 172.29.1.1	12	Address: 192.168.1.1
3	Netmask: 255.255.0.0	13	Netmask: 255.255.255.0
		14	Gateway: 192.168.1.250
		17	Controller ip: 192.168.0.1

Configuring Network Settings

NOTE: Perform the procedures in this section before you connect any codec to a network.

Connect a computer to the Remote port (①) on each unit to configure the network settings for that unit. Set one codec in the system as the controller.

See “**Serial Port Wiring**”, below to make a cable for Remote port.

See “**Configure Network Settings**” to configure the network settings.

Serial Port Wiring

Figure 9 shows how to connect a host device to the Remote port (①).

Pin	RS-232	Function
1	DCD	Data character detect
2	RX	Receive data
3	TX	Transmit data
4	DTR	Data terminal ready
5	Gnd	Signal ground
6	DSR	Data set ready
7	RTS	Request to send
8	CTS	Clear to send
9	Ring	Ring indicator

Figure 9. Pin Assignment for the Remote Port

NOTES:

- The VNC 325 uses 9-pin D **male** connectors. You may need an adapter.
- The RS-232 protocol for the Remote port is as follows:
Baud rate: 115200 **Data bits:** 8 **Parity:** None
Stop bits: 1 **Flow control:** None

Low-level Network Configuration

Before connecting a LAN port (see [item ④](#) or [item ⑤](#) on figure 2 and on page 6) on any VNC 325 to the network, you need to establish the network settings of each unit.

You also need to select one codec in the VN-Matrix system as the controller and designate that codec, by its IP address, in each codec. All normal system configuration and control is via the network interface for the designated controller, which functions as the server for the VN-Matrix. The controller can be any unit in the system, whether configured as an encoder or decoder.

In a typical installation, you need to enter the following settings for each codec:

- The IP address of the codec
- The subnet mask (netmask) of the codec
 - **For a network that is dedicated exclusively to the VN-Matrix**, which is the preferred setup, Extron recommends that you use addresses in the range of 192.168.0.1 through 192.168.0.254, with a subnet mask (netmask) of 255.255.255.0.
 - **For an open network**, contact the system administrator for a range of IP addresses.
- The IP address of the codec that is selected as the controller

NOTES:

- You need to manually assign a **known** IP address for the controller into each codec in the VN-Matrix. This allows each VN-Matrix 325 device in the system to be set to recognize the IP address of the device controller.
- Because Dynamic Host Configuration Protocol (DHCP) can change IP addresses, it is not practical to use this protocol. Extron recommends that you use a static IP address scheme.

Change the network settings for all units as follows:

1. Connect a null modem serial cable from the serial port of a computer to the Remote port (see [item ①](#) on figure 2 and on page 6) on the VNC 325 to be configured.
2. On the PC, run a terminal emulation program such as the Extron DataViewer utility or the HyperTerminal utility. The RS-232 protocol for the Remote port is as follows:



Baud rate: 115200 **Data bits:** 8 **Parity:** None
Stop bits: 1 **Flow control:** None

3. Connect the power to the VNC 325 (see [item ③](#) on figure 2 and on page 6).
The VNC 325 sends setup and diagnostic data, which appears in the terminal emulator window. After a few seconds the diagnostic data stops and the terminal emulator displays a flashing cursor.

4. Press the keyboard <Enter> key.

The VNC 325 responds with the following login prompt:

VN Matrix(R) Maintenance Console: ver n.n
192.168.0.1 login:

NOTE: The login prompt is preceded by the current IP Address of the unit, 192.168.0.1 in the example above.

5. Type the default login config and press <Enter>. The connected unit responds with the prompt password:.

6. Type the default password `config` and press <Enter>. The connected unit downloads the configuration menu (see figure 10).

NOTES:

- The IP addresses and other variable shown in figure 10 are for illustration only and may not match those on your unit.
- Many menu selections are not available if DHCP is selected. Select option 1 or 11 to toggle DHCP on and off.
- This procedure identifies the selections that you may need to make for typical low level configuration **only**. See “**Configuration Selections**” for details on all available selections.

LAN Port 1 (RJ-45, ④, on figure 2)	LAN port 2 (Optical, ⑤)
<div>Network Port 1</div> <div>=====</div> <div>0. Speed/Duplex: auto_10_100_1000 1. Boot method: static [dhcp] 2. address: 192.168.0.104 3. netmask: 255.255.255.0 4. gateway: 5. broadcast: 6. mtu: 1500 7. controller ip: 192.168.0.101 8. controller port: 5432 9. Exit</div> <div>Please select an option:</div>	<div>Network Port 2</div> <div>=====</div> <div>10. Speed/Duplex: fibre_fixed_1000F 11. Boot method: static [dhcp] 12. address: 192.168.1.2 13. netmask: 255.255.255.0 14. gateway: 15. broadcast: 16. mtu: 1500 17. ip forwarding: 0 18. webserver port: 80</div>

Figure 10. Configuration Menu

7. Change the settings as needed as follows:

NOTES:

- Do not include leading zeros when typing IP addresses. For example, type 192.168.0.104; do not type 192.168.000.104.
- Settings that you need to change for a typical low level configuration operation are:
 - **Address** (option 2 or 12)
 - **Netmask** (option 3 or 13)
 - **Gateway** (option 4 or 14)
 - **Controller IP** (option 7)
- Once you have designated a codec as the controller using option 7, you can access it via either of its LAN ports.

- Type the option number and <Enter>.
 - Type the new setting and <Enter>.
 - Once all the changes have been made, type 9 and <Enter> to save all settings and exit the menu.
8. Repeat steps 1 through 7 for each VNC 325 unit in the VN-Matrix system. Assign the same controller IP address to each unit.

Configuration Selections

- NOTES:**
- In a typical installation, you:
 - **Must** change the address (2 or 12), netmask (3 or 13), gateway address (4 or 14), and controller IP (7).
 - **May** need to change the boot method (1 or 11).
 - Most installers do **not** need to change the other selections. If you do change settings, note the existing values before the change in case you need to change back.
 - Options 0 through 6 are the settings for LAN port 1 (the RJ-45 port).
 - Options 10 through 16 are the settings for LAN port 3 (the optical port).
 - Options 7 through 9, 17, and 18 are controller related.
 - Selections marked with an asterisk (*) in options 0 and 10 below are the default VNC 325 hardware settings and the correct selection in most cases.

Table 5. Configuration Selections

LAN Port Specific Options		
Option	Function	Comments
0	Speed/Duplex: LAN port 1 link speed	Allows you to set the speed of the RJ-45 LAN port manually using the following subselections: * 1. auto_10_100_1000 2. auto_10_100 3. fixed_1000F 4. fixed_100F 5. fixed_100H
10	Speed/Duplex: LAN port 2 link speed	Allows you to set the speed of the optical LAN port manually using the following subselections: 6. fibre_auto_1000 * 7. fibre_fixed_1000F
1 and 11	Boot method: Set static or dhcp	Entering 1 (11) toggles this option. When DHCP is selected items 2 (12) through 5 (15) are not accessible. NOTE: Extron recommends that you use static IP addresses.
2 and 12	address: Set the local address of the LAN port	<ul style="list-style-type: none"> • Standard Ethernet IP addressing rules apply. • Manually enter the IP address for the port; <u>use no leading zeroes</u>. For example: 192.168.0.1 is valid, 192.168.000.001 is not valid.
3 and 13	netmask: Set the appropriate subnet mask for the network.	<ul style="list-style-type: none"> • Standard Ethernet subnet rules apply. • Manually enter the IP address for the port; <u>use no leading zeroes</u>. For example: 255.255.10.0 is valid, 255.255.010.0 is not valid.

LAN Port Specific Options		
Option	Function	Comments
4 and 14	gateway: Set the IP address of the default gateway.	<ul style="list-style-type: none"> Gateway values must be set on the streaming port otherwise no streaming status is available in the HTML network interface. The default gateway must be on the same subnet as the port to which it is assigned. <p>Manually enter the gateway address for the port; <u>use no leading zeroes</u>. For example: 192.168.0.1 is valid, 192.168.000.001 is not valid.</p> <div style="border: 1px solid black; padding: 5px;"> <p>NOTE: Only one default gateway is supported. Once a gateway is assigned to either LAN port (either option), the unselected option is no longer available. To clear a gateway address, select the available option (4 or 14) and press the <Enter> key with no gateway value entered.</p> </div>
5 and 15	broadcast:	Not required.
6 and 16	mtu: Set the maximum the number of bytes (payload) in a frame.	<ul style="list-style-type: none"> This value affects the performance of the system. A large value can cause packets to be fragmented; a small value may not make efficient use of the network capacity. The default value is 1500. In certain cases, you may need to change this value to better match the network.

Unit Specific Options		
Option	Function	Comments
7	controller ip: Set the IP address of the system controller.	<ul style="list-style-type: none"> Enter the IP address of the LAN port (option 2 or 12) over which control data is sent to the VNC 325 that is designated as the controller into all codecs in the system. <div style="border: 1px solid black; padding: 5px;"> <p>NOTES:</p> <ul style="list-style-type: none"> For proper operation, option 7 in all codecs must have the same IP address. Once you have designated a codec as the controller using option 7, you can access it via either of its LAN ports. </div> <ul style="list-style-type: none"> Manually enter the IP address for the controller; <u>use no leading zeroes</u>. For example: 192.168.0.1 is valid, 192.168.000.001 is not valid.
17	ip forwarding:	Not implemented. Do not change this value.
8	controller port: Set the number of the port that is used for communications with the system controller.	<p>By default this is set to 5432, this can be changed if required.</p> <div style="border: 1px solid black; padding: 5px;"> <p>NOTE: For proper operation, option 8 in all codecs must have the same port number.</p> </div>
18	webserver port: Set the port number that is used for communication with the server.	<p>By default this is set to 80, this can be changed if required.</p> <div style="border: 1px solid black; padding: 5px;"> <p>NOTE: For proper operation, the browser must use the same port number.</p> </div>
9	Exit Reboot and activate settings.	<p>Activate any changes made by rebooting the codec. Changes are not activated until the codec is rebooted.</p> <div style="border: 1px solid black; padding: 5px;"> <p>NOTE: Entering reboot at the terminal emulation program cursor also resets the unit.</p> </div>

Making Remaining Connections

RS-232 Over LAN Port

If you want the VN-Matrix units to pass serial data or control signals, such as for serial control of a projector, connect RS-232 devices to RS-232 Over LAN port on all codecs that are hosting controlled or controlling devices. Figure 11 shows how to connect a host device to the pass-through device to the RS-232 Over LAN port (② on [figure 2](#)).

NOTE: The RS-232 Over LAN port also connects relay contacts that turn on when a critical alarm occurs. See “[Filter settings panel](#)” to define a critical alarm.

Pin	RS-232	Alarm Relay	Function
1	DCD	—	Data carrier detect
2	RX	—	Receive data
3	TX	—	Transmit data
4	—	COM	Common
5	Gnd	Gnd	Signal ground
6	DSR	—	Data set ready
7	RTS	—	Request to send
8	—	NC	Normally closed
9	—	NO	Normally open

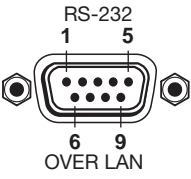


Figure 11. Pin Assignment for the RS-232 Over LAN Port

NOTES:

- The VNC 325 uses 9-pin D **male** connectors. You may need an adapter.
- The default RS-232 protocol for the RS-232 Over LAN ports are as follows:
Baud rate: 115200 **Data bits:** 8 **Parity:** None
Stop bits: 1 **Flow control:** None
These parameters are configurable to agree with device to be controller (see “[Configuring a Serial Pass-through Group](#)” in the “Operation” section).

LAN Ports

NOTES:

- The number of units that can be connected to the network, while still providing optimal performance, varies depending on the data transport method used. See “[Data Transport Methods](#)” on page 7 for details.
- Do NOT connect VN-Matrix units to an existing network until each is correctly configured. Incorrect configuration may cause disruption to other network users. See “[Configuring Network Settings](#)” to configure the units.
- Items ④ and ⑤, below, are identified in [figure 2](#) on page 6.

④ **LAN 1 port** — If desired, connect a CAT 6 cable between this port and the network.

NOTE: The factory default IP address for this port is 192.168.0.1.



1

Link (left) LED indicator — Indicates that the codec is properly connected to an Ethernet LAN. This LED should light steadily.

Act (right) LED indicator — Indicates transmission of data packets on the RJ-45 connector. This LED should flicker as the codec communicates.

- ⑤ **LAN 2 port (Optical)** — If desired, connect an IP fiber cable terminated with an LC connector.

OPTICAL



2

- NOTES:**
- Extron does not supply the plug-in SFP module for the Optical network port.
 - The factory default IP address for this port is 192.168.1.2.

RJ-45 port wiring

It is vital that your Ethernet cables be the correct cable type and that they be properly terminated with the correct pinout. Ethernet links use Category (CAT) 5e or CAT 6, unshielded twisted pair (UTP) or shielded twisted pair (STP) cables, terminated with RJ-45 connectors. Ethernet cables are limited to a length of 328 feet (100 m).

- NOTES:**
- It is crucial to the effective operation of VN-Matrix 325 that sufficient data throughput be achieved, especially where multiple sources are encoded. The network efficiency is directly affected by the speed and configuration of each element, such as switchers and routers, within its infrastructure. The VN-Matrix 325 system achieves optimum transmission results over a dedicated 1 Gbps network (1000Base-T, also known as Gigabit Ethernet).
 - Do not use standard telephone cables. Telephone cables do not support Gigabit Ethernet.
 - Do not stretch or bend cables. Transmission errors can occur.

The Ethernet cable can be terminated as a straight-through cable or a crossover cable and must be properly terminated for your application (see figure 12).

- **Crossover cable** — Direct connection between the computer and a VNC 325 encoder
- **Patch (straight) cable** — Connection of a VNC 325 encoder to an Ethernet LAN

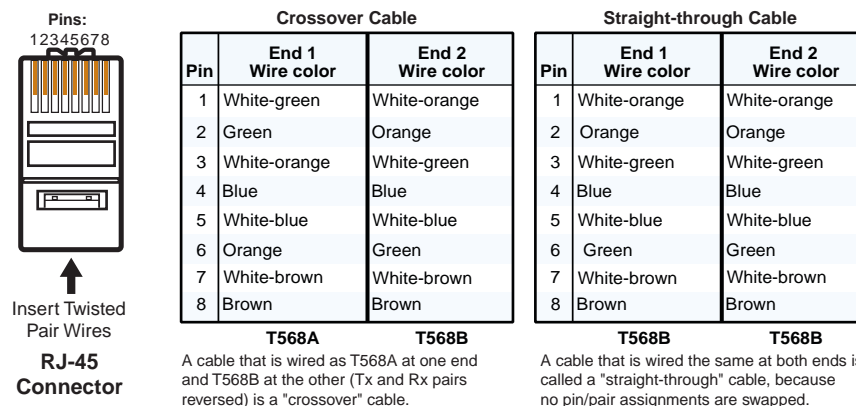


Figure 12. RJ-45 Connector and Pinout Tables

Video Input, Output, and Loop Connections

The three video connections are connected differently, depending on whether the codec is to be configured as an encoder or a decoder.

Encoder configuration

See figure 13.

- ① **SDI Out BNC connector** — This connector provides a buffered loop through of the original source with or without an optional text overlay.
- ② **SDI In BNC connector** — Connect an SDI, HD-SDI, or 3G-SDI digital video input for encoding and streaming to one or more decoders via the LAN port (item ④ on figure 13).
- ③ **Loop BNC connector** — This connector provides a buffered loop through of the original source.

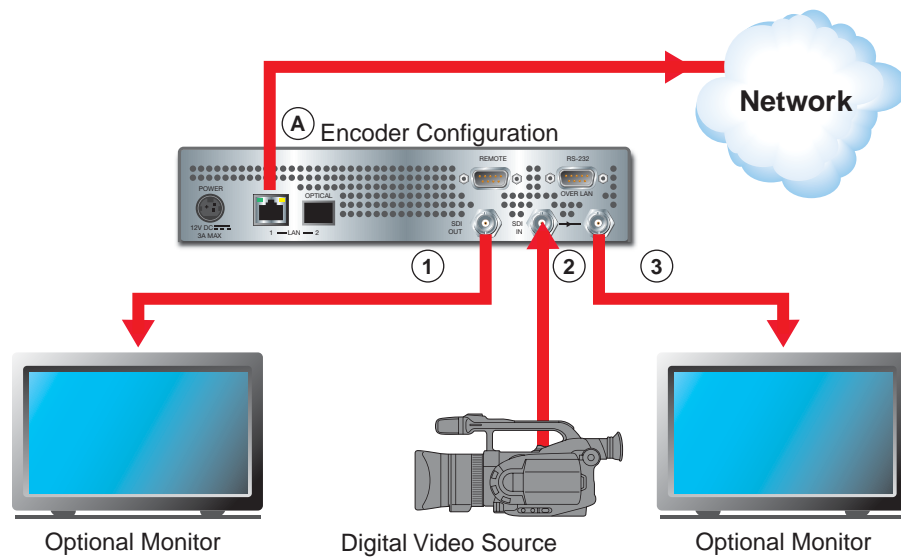


Figure 13. Video Connections in the Encoder Configuration

Decoder configuration

See figure 14.

- ① **SDI Out BNC connector** — Connect an SDI, HD-SDI, or 3G-SDI digital video device to display the digital video that was streamed to the decoder (item **B** on figure 14). The video output is in the same format as the originating source at the encoder. When no video streams are being decoded, this output can provide either a frozen image of the last received frame or a static splash screen. See “**Decoder Video Configuration Panel**” in the “Operation” section to configure the splash screen.
- ② **SDI In BNC connector** — If desired, connect a local SDI input of the same refresh rate as the streamed video to act as a digital genlock signal for synchronizing the decoder to a local standard.

NOTE: If you use the SDI In connector for a synch signal, you must configure the decoder accordingly (see “**Decoder Video Configuration Panel**” in the “Operation” section).

Loop BNC connector — Not used.

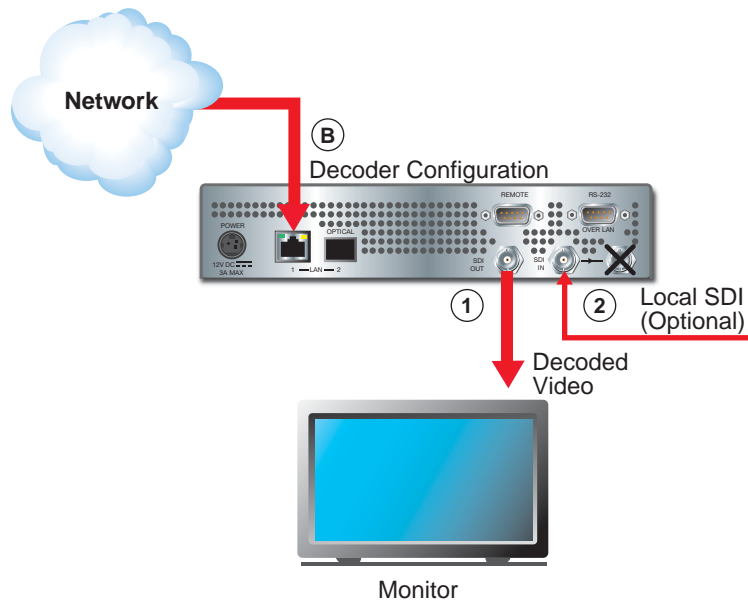


Figure 14. Video Connections in the Encoder Configuration

Configure Encoders and Decoders

NOTE: Perform the procedures in this section after you connect all codecs in the system to a network.

After the low-level configuration described on [page 17](#), system configuration and operation is via the network interface (built-in HTML pages) of the unit designated as the controller. The pages can be viewed by any web browser, such as Mozilla Firefox, version 4.0 or newer (preferred), or Microsoft Internet Explorer, version 6.0 or newer, provide access to various system parameters.

NOTE: Whichever browser you use, it must be configured to accept cookies and be JavaScript-enabled.

Startup and Login

1. Connect a computer to the same network as the VN-Matrix 325 device that is configured as the controller.

NOTE: The computer must be on the same subnet as the VN-Matrix 325 units.

2. In the web browser, enter the IP address of the VNC 325 that is configured as the controller into the address bar of the web browser (see figure 15).

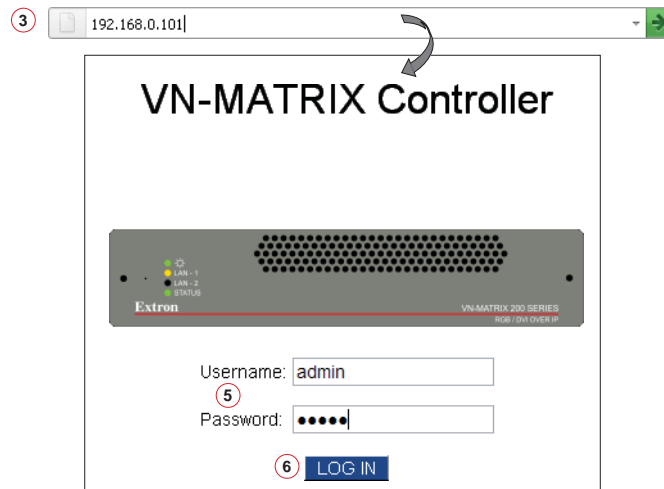


Figure 15. Controller Login via the LAN Port

3. Press <Enter>. The login screen appears.

4. Enter the Username and Password.

NOTES:

- The VN-Matrix 325 codecs have two valid usernames:
 - **admin** — allows full read/write access to all setup parameters.
 - **public** — allows read-only access to setup parameters.
- As shipped from the factory, the password for both usernames is the same as the name itself (the password is “admin” for the admin username and “public” for the public username).
- The password can include letters, numbers, and the underscore character. The password is case-sensitive.
- For the system configuration, use the admin username.

5. Click the **LOG IN** button or press <Enter> on the keyboard. The VNC 325 HTML page opens to the Device List page (see figure 16). The web page lists all VN-Matrix devices that are connected to the system controller.

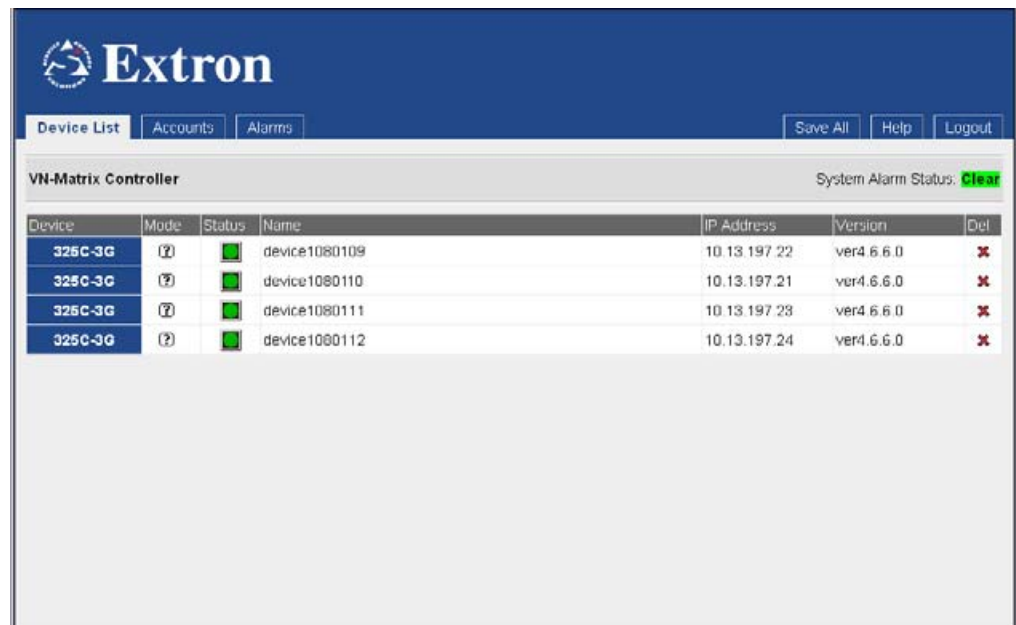


Figure 16. Device List Page

Configure the Units as Encoders or Decoders

A typical VN-Matrix 325 network (see figure 17) includes an encoder (source), a decoder (display), and a controlling PC. The data transport method, TCP or RTP, is defined on the decoder configuration page. Multicasting is selected on the encoder configuration page (see “[Enable multicast streaming](#)” to select the multicast and “[Data Transport Methods](#)” for definitions of the methods).

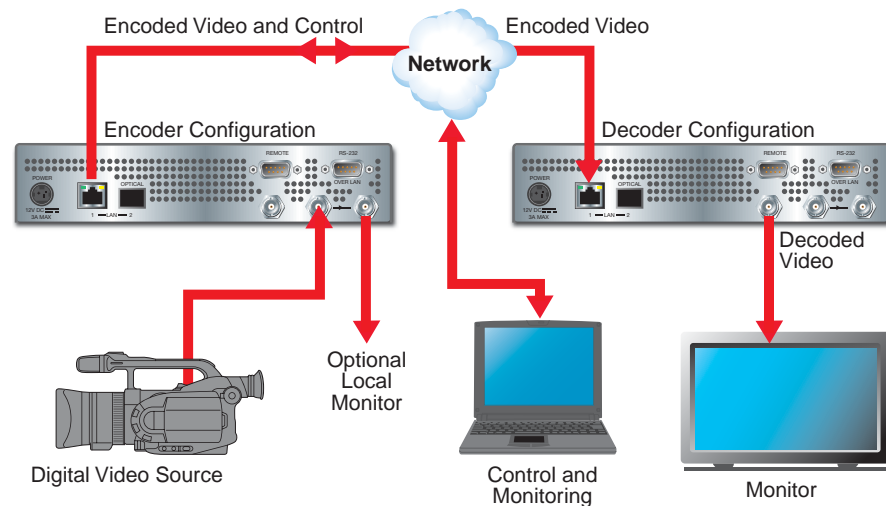


Figure 17. Typical VN-Matrix 325 System

The Mode column on the Device List page (see figure 18) shows how each VNC 325 unit is configured using the following icons:

Encoder = Encoder Decoder = Decoder VNM Recorder = VNM Recorder Undefined = Undefined

NOTE: If this is the initial setup, none of the devices have been defined and thus show the Undefined icon in the Mode column.

Device List							Accounts	Alarms	Save All	Help	Logout
VN-Matrix Controller											
System Alarm Status: Clear											
Device	Mode	Status	Name	IP Address	Version	Del					
325C-3G	?	●	device1080109	10.13.197.22	ver4.6.6.0	✕					
325C-3G	?	●	device1080110	10.13.197.21	ver4.6.6.0	✕					
325C-3G	?	●	device1080111	10.13.197.23	ver4.6.6.0	✕					
325C-3G	?	●	device1080112	10.13.197.24	ver4.6.6.0	✕					

Figure 18. Selecting a Device

- NOTES:**
- The VNM Recorder is not documented in this guide. Inclusion in this list is for completeness and reference only.
 - Only devices that are or have been configured to connect to the system controller (using the procedure detailed in “[Configuring Network Settings](#)”) are listed.
 - The device list may show more devices than are in your system. This is because the controller maintains a list of devices that have been used in the past and are not currently available. In this case, the IP address entry for that device is blank.
 - If desired, remove devices that have been physically removed from the system from this listing by clicking the Delete icon (✕).

Configure the devices as encoders or decoders as follows.

1. On the device list page, click anywhere on the row (except the Delete column) for the device to be configured (item ① in **figure 18**). This selects that device and displays the device page (see **figure 19**).

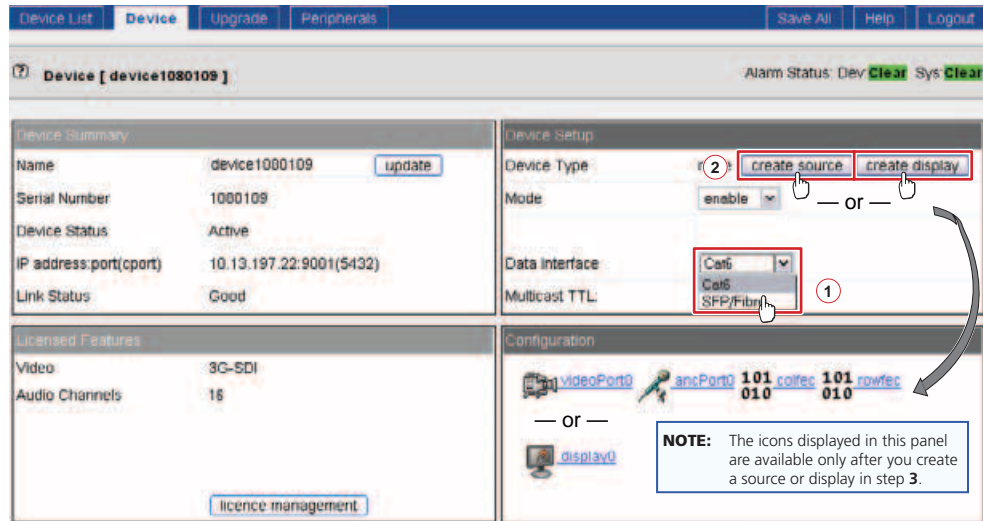


Figure 19. Configuring a Codec as a Source or Display

2. In the Device Setup panel, click the Data Interface drop-down box (① in **figure 19**) and select either of the following as the cable to output or receive the video signal.

Cat6 (LAN port 1, **item ④** in **figure 2** and on page 6)

SFP/Fibre (LAN port 2, **item ⑤** in **figure 2** and on page 6)

3. In the Device Setup panel (② in **figure 19**), configure the device as either an encoder or decoder as follows:

Encoder — Click the **create source** button. A video icon (📺), an audio (ANC) icon (🎤), and two forward error correction (FEC) icons (101 010) appear in the Configuration box. Proceed to step 6.

Decoder — Click the **create display** button. A display icon (📺) appears in the Configuration box. Proceed to step 4.

NOTE: If a device is already configured, the device type is identified and the only button available is “change device type”.

Device Setup	
Device Type	source change device type
Mode	enable ▼
Identify	<input checked="" type="checkbox"/>
Data Interface	SFP/Fibre ▼
Multicast TTL:	2

Click the button to display the create source and create display buttons, and then perform step 3.

If the device reports “Device is streaming data”, log on to all decoders that are connected to this encoder, one at a time, and clear the connection (click **Please select a source** on the display page (see **figure 20** on the next page).

4. Click the display icon that appears in the configuration box after you have created a display in step 3 (① in figure 20). The display configuration page appears.

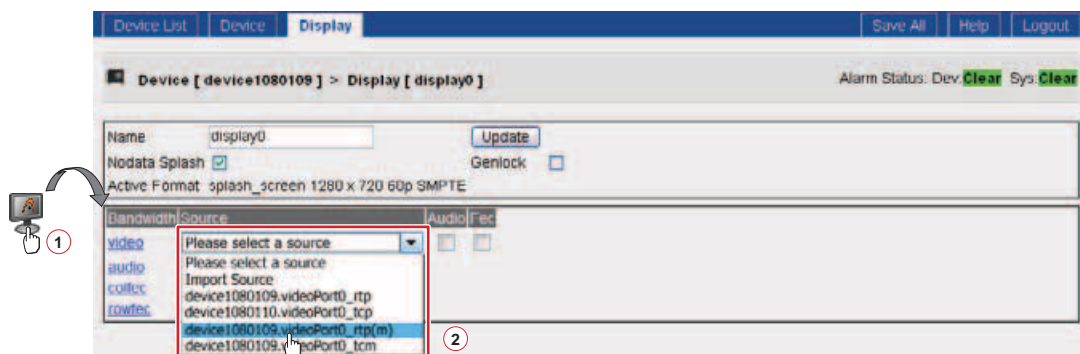


Figure 20. Source Configuration

5. Click the **Video Source** drop-down box and then select the video source (②).
- Choose **rtp(m)** for multicast RTP streaming.

NOTE: **rtp(m)** is available only if you have enabled multicast streaming. See "**Enable multicast streaming**".

- Choose **rtp** for unicast RTP streaming.
- Choose **tcp** for unicast TCP streaming.

NOTE: See "**Data Transport Methods**" for more information.

6. Click the **Save All** tab to save the configuration changes.

Save All

NOTE: If you do not click **Save All**, the configuration settings are lost when power is cycled on and off.

Enable multicast streaming

NOTES:

- The VN-Matrix 325 supports IGMP V2 for multicast streaming.
- The multicast streaming setting does **NOT** track across all four encoder configuration pages (video, anc [ancillary, specifically audio], colfec [column forward error correction], and rowfec [row forward error correction]). For most applications, the same transport should be set for all stream elements, but this is not mandatory.

1. If necessary, click the **Device** tab to display the device page (see **figure 19**). Device
2. Click the video encoder icon that appears in the configuration box after you have created a source in “**Configure Encoders and Decoders**”, step 3 (① in **figure 21**). The video encoder Configuration appears.

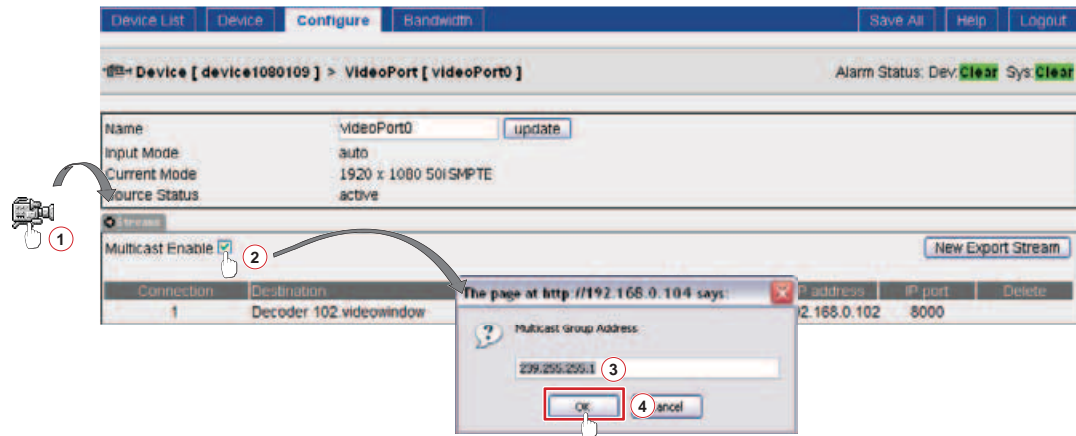


Figure 21. Encoder Configuration

3. Click (select) the **Multicast Enable** check box (② in **figure 21**). The Multicast Group Address dialog box appears, providing a default multicast group address.
4. Change the multicast group address to the value required for the system in use (③ in **figure 21**).

NOTE: Extron suggests modifying the group address so that the value of the last octet of this address is the same as value of the last octet of the IP address of the device.

5. Click the **OK** button (④ in **figure 21**).
6. Repeat step 2, substituting the anc (audio) port icon (🔊) for the video icon.
7. Repeat steps 3 through 5.
8. Repeat step 2, substituting the colfec port icon ($\begin{smallmatrix} 101 \\ 010 \end{smallmatrix} \text{ colfec}$) for the video icon.
9. Repeat steps 3 through 5.
10. Repeat step 2, substituting the rowfec port icon ($\begin{smallmatrix} 101 \\ 010 \end{smallmatrix} \text{ rowfec}$) for the video icon.
11. Repeat steps 3 through 5.

Operation

This section provides a detailed description of the physical and HTML operator interface of the VNC-325 codec, including:

- **Indications and Controls**
- **Network Interface**

Indications and Controls

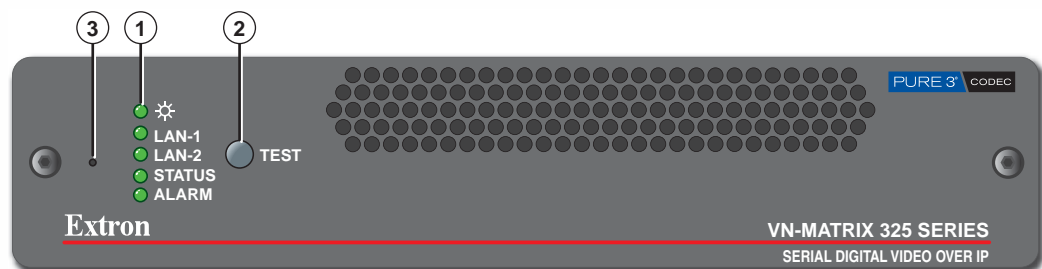


Figure 22. Front Panel Indications and Controls

① LEDs

Power (☀) LED —

Lit — The unit is receiving power and there are no alarms.

Blinking — An overtemperature, power overload, or power underload condition exists. Cycle power to clear the alarm.

LAN-1 and LAN-2 LEDs —

Lit or flashing — The associated Ethernet connection is active.

Unlit — The associated Ethernet connection is inactive.

Status LED —

Unlit — Encoder — No video input is detected.

— or —

Decoder — No network source is detected.

Flashing — Encoder — Unit is streaming video.

— or —

Decoder — Unit is receiving video.

Lit (encoder only) — Video is present but encoder is not streaming it. The unit may also be disabled or in standby mode.

Alarm LED — An alarm that you have defined as critical has occurred.

NOTE: See “[Filter settings panel](#)” to define a critical alarm.

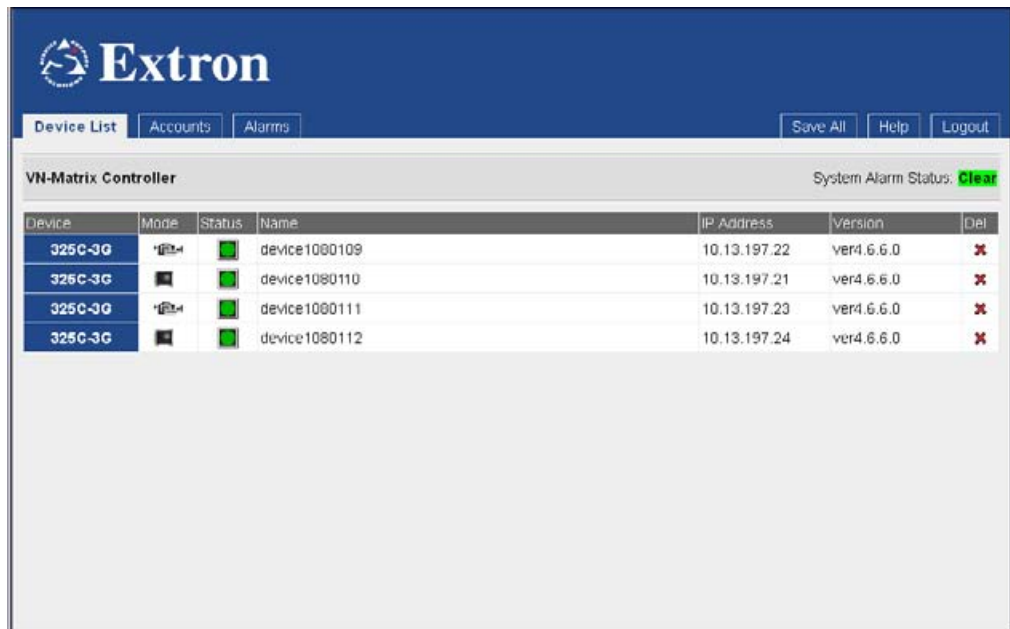
- ② **Test button** — Press and **hold** to suspend the active stream of the encoder and display a test pattern on the SDI Out connector (item ⑥ in figure 2 and on page 7). Release to end the test pattern. See “**Test Pattern**” in the “Reference Information” section for the test patterns.
- ③ **Reset button (to the left of the LAN 2 LED)** — Insert a straightened paper clip into the hole on the front panel and press and release to reboot the operating system.

Network Interface

Once all VN-Matrix 325 devices have been correctly set-up for and connected to a network, any further configuration and operation is via the network interface (built-in HTML pages) of the unit designated as the controller. The pages can be viewed by any web browser, such as Mozilla Firefox, version 4.0 or newer (preferred), or Microsoft Internet Explorer, version 6.0 or newer, provide access to various system parameters.

NOTE: Whichever browser you use, it must be configured to accept cookies and be JavaScript-enabled.

See “**Startup and Login**”, on page 25, to access the network interface and down load the device list page (see figure 23).



Device	Mode	Status	Name	IP Address	Version	Del
325C-3G	1080i	OK	device1080109	10.13.197.22	ver4.6.6.0	X
325C-3G	1080i	OK	device1080110	10.13.197.21	ver4.6.6.0	X
325C-3G	1080i	OK	device1080111	10.13.197.23	ver4.6.6.0	X
325C-3G	1080i	OK	device1080112	10.13.197.24	ver4.6.6.0	X

Figure 23. Device List Page

Device List Page

Device Field

This field identifies the video format of the devices that are present on the network:

- **3G** — A device that operates at all resolutions up to and including the 3G-SDI standard.
- **HDSOI** — A device that is operates at all resolutions up to and including the HD-SDI standard.
- **SDI** — A device that operates at resolutions up to the SDI standard.

NOTE: All VNC 325 codecs are 3G.

Device Mode

The Mode column on the Device List tab shows how each VNC 325 unit is configured using the following icons:

 = Encoder  = Decoder  = VNM Recorder  = Undefined

- NOTES:**
- The VNM Recorder is not documented in this guide. Inclusion in this list is for reference only.
 - Only devices that are or have been configured to connect to the system controller (using the procedure detailed in “**Configuring Network Settings**”) are listed.
 - The device list may show more devices than are in your system. This is because the controller maintains a list of devices that have been used in the past and are not currently available. In this case, the IP address entry for that device is blank.

Removing a device from the network

Devices that have been physically removed from the system can be removed from this listing as follows:

1. Click the Delete icon (✖) for the device to be removed (see figure 24). A confirmation dialog box appears.

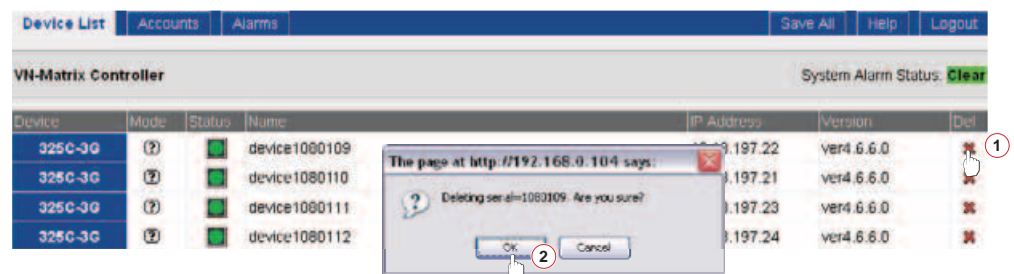


Figure 24. Removing a Device from the Network

2. Click **OK** in the confirmation dialog box.

Device Page

The device page for a specific codec (see figure 25) is available when you select that unit by clicking anywhere on the row (except the Delete column) of a device on the device list page (①). Figure 25 shows the device page for a unit that is configured as an encoder.

The screenshot shows the VN-Matrix Controller interface. At the top, there are tabs for 'Device List', 'Accounts', and 'Alarms'. Below this, a table lists several devices. The first device, 'device1080109', is highlighted with a red box and a circled '1'. An arrow points from this device to the 'Device' tab in the bottom navigation bar, which is also circled with a '6'. The 'Device' page is then displayed, showing a 'Device [device1080109]' header. Below this, there are four main panels: 'Device Summary' (circled 2), 'Licensed Features' (circled 4), 'Device Setup' (circled 3), and 'Configuration' (circled 5). The 'Device Summary' panel shows details like Name, Serial Number, Device Status, IP address, and Link Status. The 'Licensed Features' panel shows Video and Audio Channels. The 'Device Setup' panel shows Device Type, Mode, Identity, Data Interface, and Multicast TTL. The 'Configuration' panel shows a diagram of the device's ports and their connections.

Device	Mode	Status	Name	IP Address	Version	Del
325C-3G	(?)	✓	device1080109	10.13.197.22	ver4.6.6.0	✖
325C-3G	(?)	✓	device1080110	10.13.197.21	ver4.6.6.0	✖
325C-3G	(?)	✓	device1080111	10.13.197.23	ver4.6.6.0	✖
325C-3G	(?)	✓	device1080112	10.13.197.24	ver4.6.6.0	✖

Device Summary	
Name	device1080109 update
Serial Number	1080109
Device Status	Active
IP address:port(cport)	192.168.0.104(5432)
Link Status	Good

Licensed Features	
Video	3G-SDI
Audio Channels	16

Device Setup	
Device Type	source change device type
Mode	enable
Identity	<input type="checkbox"/>
Data Interface	Can6
Multicast TTL	2

Configuration	
videoPort0	101 colfec 101 rowfec
ancPort0	010 010

Figure 25. Typical Device Page for an Encoder

The device page is divided into four information and configuration panels:

- **Device summary** (②)
- **Licensed features** (③)
- **Device setup** (④)
- **Configuration** (⑤)

Device summary panel

This panel consists of the following fields:

- **Name** — This field displays the name of the device. You can change the name of the unit to a more meaningful value for your installation as follows:
 1. Highlight the existing device name.
 2. Type the new name.
 3. Click the **update** button.

Device Summary	
Name	device1080109 <input type="button" value="update"/>
Serial Number	1080109
Device Status	Active
IP address: port(cport)	192.168.0.104 (5432)
Link Status	Good

Encoder

NOTE: Spaces within names can cause issues when controlling the system using a third-party control system. Extron recommends avoiding spaces within names..

- **Serial Number** — This read-only field displays the serial number of the device, information is required when upgrading the licence on a device.
- **Device Status** — This read-only field displays either of the following messages:
 - **Active** — The device is present and operating.
 - **Inactive** — The controller cannot contact the device. It may be powered down or the network cable is unplugged.
- **IP address: port** — This read-only field displays two pieces of information:
 - The IP address that is assigned to LAN port 1.
 - The port numbers that have been configured for send and receive of UDP control information. By default these are 9001 (send) and 5432 (receive).
- **Link Status** — This read-only field displays the condition of the Ethernet network link to the controller in one of the following messages:
 - **Good** — There is little or no control data packet loss.
 - **Fair** — There is a small amount of control data packet loss.
 - **Poor** — A bad network link exists.

Licensed features panel

This panel consists of the following read-only fields, which provides a description of features that are enabled on the device:

- **Video** — For the VNC 325, this field always reads 3G-SDI.
- **Audio** — For the VNC 325, this field always reads 16.

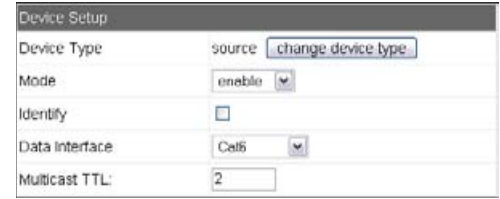
Licensed Features	
Video	3G-SDI
Audio Channels	16
<input type="button" value="licence management"/>	

The licence management button opens the License page where additional features may be enabled.

Device setup panel

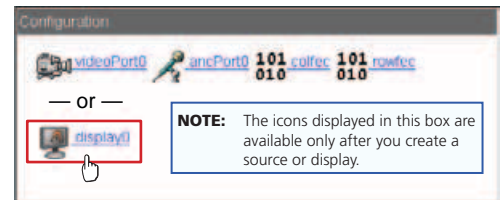
The Device setup panel allows a codec to be configured as either an encoder or a decoder. (see “[Configure Encoders or Decoders](#)”). The panel consists of the followings:

- **Device Type** — Select **create source**, **create display**, or (if the device is already configured) **change device type**.
- **Mode**:
 - **Enable** — Normal operation; image transport is enabled.
 - **Disable** — Image transport is disabled.
 - **Test** — Select to suspend the active stream of the encoder and display a test pattern on the SDI Out connector ([item 6](#) in [figure 2](#) and on [page 7](#)). See “[Test Pattern](#)” in the “Reference Information” section for the test patterns.
- **Identify** — Select (check) this box to overlay the device name (see “[Device summary panel](#)”) on the content that is output on the rear panel SDI Out BNC connector.
- **Source Identify (decoder only)** — Select (check) this box to overlay the name of the device that it is decoding (see “[Device summary panel](#)”).
- **Data Interface** — The selection defines which of the two network interfaces, LAN port 1 (**Cat6**) or LAN port 2 (**Fibre**) to use for data transport.
- **Multicast TTL** — This value sets the Time To Live (TTL — the number of routers that the multicast packet crosses between routed networks before it is dropped) for multicast packets.



Configuration panel

The Configuration panel provides access to the device configuration pages. Click on an icon to access the configuration page for that device. The example at right shows selecting an encoder.



Configuration Page — Video Encoder

The video encoder configuration page (see figure 26) is accessed by clicking the video icon in the configuration panel of the device page and consists of two panels. This page also provides access to the bandwidth management page via the **Bandwidth** tab (see “[Bandwidth Management Page and Typical Bit Rates](#)”).

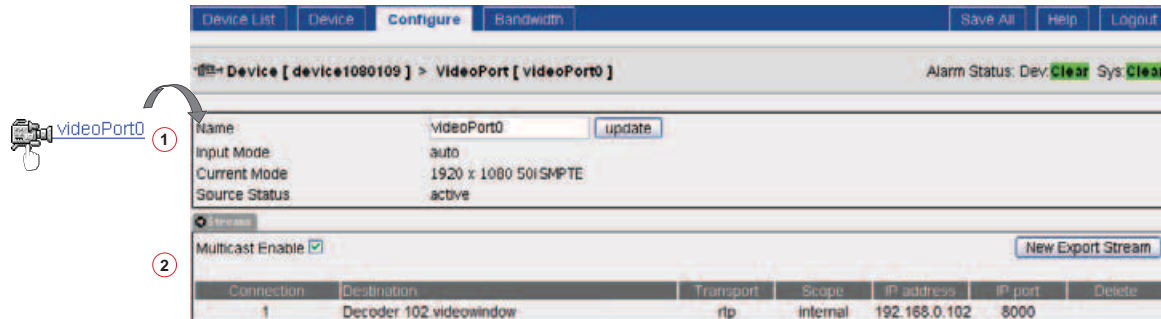


Figure 26. Video Encoder Configuration Page

The top panel of the video encoder configuration page (① on figure 26) provides the following information:

- **Name** — This field displays the name that is applied to the video port, that is, the name of the image stream. The name is displayed next to the video icon in the configuration panel of the device page. Note that this need not be the same as the name applied to the physical unit itself. You can change the name to a more meaningful value for your installation. Change the device name as follows:

1. Highlight the existing device name.
2. Type the new name.
3. Click the **update** button.



NOTE: Spaces within names can cause issues when controlling the system using a third-party control system. Extron recommends avoiding spaces within names..

- **Input Mode** — The VN-Matrix 325 codec supports a fully automatic detection of the connected signal format. No manual configuration is required.
- **Current Mode** — This value reports the currently detected source type.
- **Source Status** — This value reports the status of the input connection.
 - **Unplugged** — Indicates that either there is no source connected or no invalid video is present.
 - **Active** — Indicates that a valid video connection is present.

Streams panel

The bottom, Streams, panel of the video encoder Configuration page (② on figure 26) provides details of any active video encoder streams. The data transport method, TCP or RTP, is defined on the decoder configuration page (see “[Configure Encoders or Decoders](#)”). Multicasting is selected on this page (see “[Enable multicast streaming](#)” to select the multicast and “[Data Transport Methods](#)” for definitions of the methods).

The **New Export Stream** function is not supported.

Configuration Page — Audio Encoder

The audio encoder configuration page (see figure 27) is accessed by clicking the audio icon in the configuration panel of the device page.

Device List Device Configure Save All Help Logout

Device [device1080109] > ANCPort [ancPort0] Alarm Status: Dev Clear Sys Clear

ancPort0 1 Name: ancPort0 update

2 Transport Mode: stereo 2a channel pair 1 2b channel pair 2 channel pair 3 channel pair 4 channel pair 5 channel pair 6 channel pair 7 channel pair 8

3 Fec Rows: 5 Fec Columns: 5 Fec Mode: Row + Column Overhead: 40% (6.4 Mbps) Error Injection Rate: 0

4 Multicast Enable New Export Stream

Connection	Destination	Transport	Scope	IP address	IP port	Delete
1	Decoder 102.audiowindow	rtp	Internal	192.168.0.102	8000	

Figure 27. Audio Encoder Configuration Page

The page consists of four panels:

- **Name (1)**
- **Audio (2)**
- **Forward Error Correction (3)**
- **Streams (4)**

Name panel

The Name panel (1 on figure 27) displays the name that is applied to the audio port, that is, the name of the audio and other audio data stream. The name is displayed next to the anc (audio) icon in the configuration panel of the device page. Note that this need not be the same as the name applied to the physical unit itself. You can change the name to a more meaningful value for your installation. Change the device name as follows:

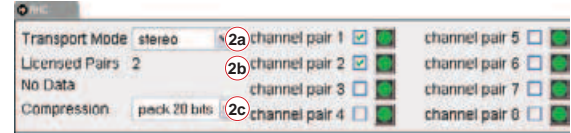
1. Highlight the existing device name.
2. Type the new name.
3. Click the **update** button.

Stream1 update

NOTE: Spaces within names can cause issues when controlling the system using a third-party control system. Extron recommends avoiding spaces within names..

ANC (Audio) panel

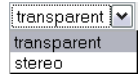
The anc (audio) panel provides control and configuration of the audio data channels.



The SDI/HDSDI/3G SDI video transport supports up to 16 audio channels, arranged in four groups of four channels each.

- Transport Mode (2a)**

The VN-Matrix system supports two audio transport modes:



Transparent — The compression engine streams the selected audio data exactly as embedded in the SDI/HDSDI/3G SDI format, with no processing. This mode can result in a high bit rate.

Stereo — The compression engine extracts a single stereo pair (two channels) of audio data and packs it into the data stream.

- Channel pair selection (2b)**

Channel pair 1 — Selects group 1, channels 1 and 2.

Channel pair 2 — Selects group 1, channels 3 and 4.

Channel pair 3 — Selects group 2, channels 1 and 2.

Channel pair 4 — Selects group 2, channels 3 and 4.

Channel pair 5 — Selects group 3, channels 1 and 2.

Channel pair 6 — Selects group 3, channels 3 and 4.

Channel pair 7 — Selects group 4, channels 1 and 2

Channel pair 8 — Selects group 4, channels 3 and 4.

In Transparent mode, you can select from two to eight channel pairs; you cannot select a single pair. In stereo mode, you can select only one channel pair.

The indicator to the right of the list showing each channel pair is green if that audio group is present in the SDI source.

- Compression (2c)**

NOTE: The compression drop box is available only when the stereo transport mode is selected.

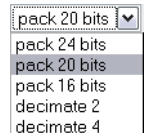


Table 6. Audio Compression Selections and Associated Bit Rates

	Compression selection	Bits per sample	Sample rate	Bit rate, 1 channel	Bit rate, stereo	Comment
48 kHz sampling	pack 24 bits	24	48,000	1,152,000	2,304,000	Native, no compression
	pack 20 bits	20	48,000	960,000	1,920,000	Native, no compression
	pack 16 bits	16	48,000	768,000	1,536,000	Bit depth decimation
	decimate 2	16	24,000	384,000	768,000	Bit depth decimation, 0.5 sample rate
	decimate 4	16	12,000	192,000	384,000	Bit depth decimation, 0.25 sample rate

Forward error correction (FEC) panel



Figure 28. Audio Encoder FEC Panel

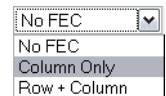
- NOTES:**
- FEC is **only** applied to the audio data channel; it is **not** applied to the video channel.
 - FEC is effective only for RTP transports. It should not be used for TCP transport.
 - FEC is not required, and is not applied when the encoder is configured in stereo mode.

Forward error correction can be applied to the audio data in data streams that use the RTP transport to protect audio data against data loss. Forward error correction enables the decoder to recreate data that has been lost or corrupted without retransmission. FEC adds additional data to the stream that the decoder can use to detect and reconstruct any lost packets. The FEC data is sent separately from the image and audio data.

The level of FEC can be set to protect against different levels of data loss. This produces a corresponding change in the amount of data that is transported and thus, the bit rate is increased or decreased in proportion to the amount of FEC applied.

The VN-Matrix 325 products implement the recommendations defined by the PRO-MPEG Code of Practice #3 (CoP3)/SMPTE 2022 standard.

3a) FEC Mode — The FEC can be applied as either column only or row and column.



- **Row FEC** protects against the loss of a single packet. It is the simplest method of protection and results in the lowest overhead in terms of bit rate and latency. However, it cannot handle consecutive packet losses (burst packet loss).
- **Column FEC** protects against burst packet loss, providing that the burst of packet losses are not in the same row. Since correction data is only calculated on one dimension, column FEC is known as 1-dimensional (1-D) FEC.

By using both FEC methods together, 2-dimensional (2-D) FEC, the combined effect protects against more loss combinations than either scheme by itself.

P1	P2	P3	P4	F _R 1
P5	P6	P7	P8	F _R 2
P9	P10	P11	P12	F _R 3
P13	P14	P15	P16	F _R 4
P17	P18	P19	P20	F _R 5
F _C 1	F _C 2	F _C 3	F _C 4	

The chart at left shows the FEC scheme applied to a 4 column x 5 row structure. This scheme adds 5 row FEC packets (F_R1 through F_R5) and 4 column FEC (F_C1 through F_C4) packets to every 20 data packets. This scheme can protect for burst packet losses up to 5 packets long.

P1	P2	P3	P4	F _R 1
P5	x	P7	P8	F _R 2
P9	P10	P11	P12	F _R 3
P13	x	x	x	F _R 4
P17	P18	P19	P20	F _R 5
F _C 1	F _C 2	F _C 3	F _C 4	

If packet P6 is lost or corrupted (x), the loss can be corrected by using the F_R2 FEC packet. However, corrupt packets P14, P15, and P16 cannot be corrected using the row FEC packet (F_R4) because too much data is missing.

To correct these packets, the column FEC data is used. Packets 15 and 16 can be corrected using F_C3 and F_C4 column FEC packets. Before

correcting packet 14, packet 6 must first be corrected using the row FEC. After this, the column FEC can be used to correct packet 14.

- ③b **Fec Rows and FEC Columns** — Extron recommends a setting of 5 for rows and 5 for columns, which should be the starting point for the error correction for the audio transport and provides rugged operation on uncorrected IP networks.

The values that you set in the FEC row and column drop down lists depend on the quality of the network link that is in use. The diagrams above show that the FEC data can add large overhead to the overall bit rate transported over the network. Therefore certain settings, while they may provide a high level of reliability, are inefficient. Alternatively, settings that add little overhead may not provide a sufficient level of protection on networks with a poor quality of service.

- ③c **Error Injection Rate** — This setting should be left at 0. It used for test purposes **only**, to drop packets artificially in order to test the effectiveness of the FEC scheme.

Streams panel

The audio encoder configuration page streams panel (see figure 29) provides details of any active audio encoder streams. The data transport method, TCP or RTP, is defined on the decoder configuration page (see “[Configure Encoders or Decoders](#)”). Audio multicasting is selected in this panel (see “[Enable multicast streaming](#)” to select the multicast and “[Data Transport Methods](#)” for definitions of the methods).

Connection	Destination	Transport	Scope	IP address	IP port	Delete
1	Decoder 102.audiowindow	rtp	internal	192.168.0.102	8000	

Figure 29. Audio Encoder Streams Panel

NOTE: This setting does **NOT** track the same setting applied in other (video, anc, colfec, and rowfec) encoder configuration pages. For most applications, you should set the same transport for all stream elements, but this is not mandatory.

The **New Export Stream** function is not supported.

Configuration Page — Colfec and Rowfec Encoders

The colfec and row encoder configuration pages (see figure 30, on the next page) provide the same basic function, enabling of multicasting. The encoder that you may need to configure depends on whether you have selected column only (colfec encoder) or and Row + column (rowfec encoder) as the FEC mode (see “[Forward error correction \(FEC\) panel](#)”). The streams panel provides details of any active FEC encoder streams. The data transport method, TCP or RTP, is defined on the decoder configuration page (see “[Configure Encoders or Decoders](#)”). FEC multicasting is selected on this page (see “[Enable multicast streaming](#)” to select the multicast and “[Data Transport Methods](#)” for definitions of the methods).

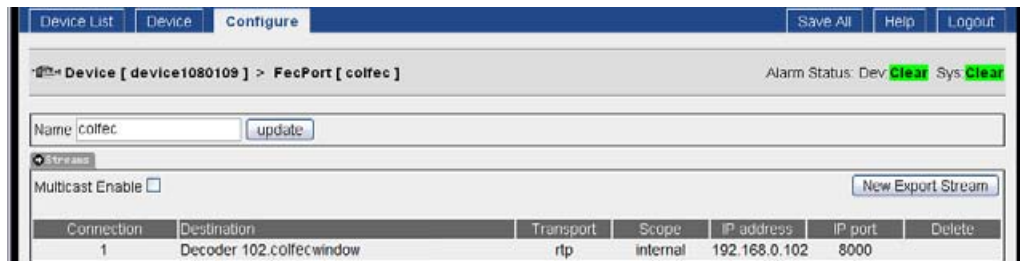


Figure 30. FEC Encoder Streams Panel

NOTE: This setting does **NOT** track the same setting applied in other (video, anc, colfec, and rowfec) encoder configuration pages. For most applications, you should set the same transport for all stream elements, but this is not mandatory.

The **New Export Stream** function is not supported.

Bandwidth Management Page and Typical Bit Rates

To access the bandwidth management page (see figure 31), click the **Bandwidth** tab on the video encoder configure page.

Bandwidth

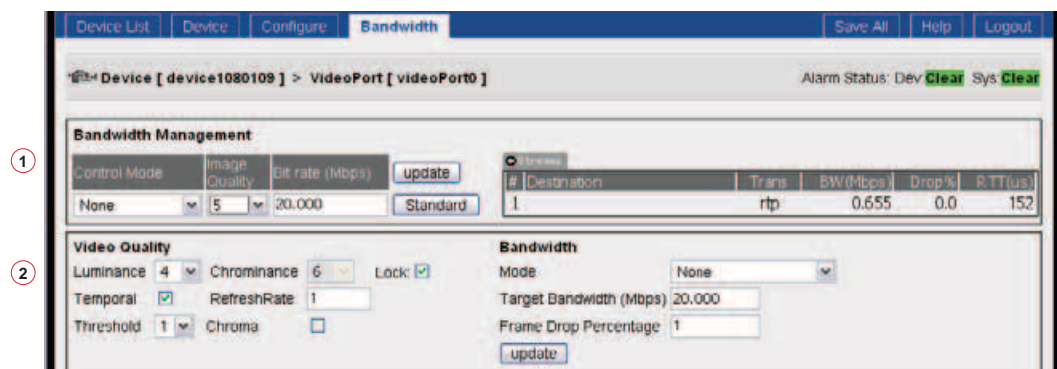


Figure 31. Bandwidth Management Page

The bandwidth page provides for the control of the spatial and temporal compression settings for the encoded source.

The available controls consist of two main panels:

- ① **Bandwidth Management (standard) controls** — Provides a simple interface that configures a subset of the VN-Matrix 325 compression toolset (see "**Bandwidth management standard controls panel**").
- ② **Advanced controls** — Provides control of the complete VN-Matrix 325 compression toolset (see "**Advanced controls panel**"). To hide this panel click the **Standard** button in the Bandwidth Management panel.

NOTE: When you hide the Advanced control panel, default settings are applied to some of the controls. These settings remain in force while the Standard panel controls are in use and cancel any changes that were made previously.

Bandwidth management standard controls panel



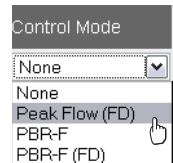
Figure 32. Bandwidth Management (Standard) Controls Panel

The Streams information area (1a) provides statistics for any active streams currently running from the encoder. The bit rate value is the total for all streams, including video, and (audio) and forward error correction.

Configuration for the encoder is made via three entries:

- 1b **Control Mode** — This drop down box is a set of four modes that apply different spatial and temporal compression schemes to manage the encoded image data stream.

NOTE: These control modes are also accessible in the Advanced settings panel.



- **None** — The compression scheme maintains a constant image quality. The bit rate varies dependant on the content. Slowly moving or static image content has a lower bit rate than fast moving image sequences. There is no bit rate limiting in this mode.
- **Peak Flow (FD)** — The spatial image quality is held constant, however, a bit rate limit is applied. Controlling the frame update rate whenever the bit rate limit is exceeded maintains the limit.
- **PBR-F** — This is a peak bit rate mode. The spatial quality is held constant until the bit rate limit is exceeded, at which point, additional spatial compression is applied to keep the bit rate at the specified limit.

NOTE: If you cannot maintain the bit rate limit using only spatial compression, then you should choose a different control mode or increase the bit rate limit.

- **PBR-F (FD)** — This mode is similar to PBR-F with the addition of dynamic frame rate management if the spatial compression is insufficient to maintain the bit rate limit.
- 1c **Image Quality** — Image quality controls the spatial compression. A setting of 4 provides a visually lossless image. A higher setting results in higher compression and lower bit rate for the encoded stream. A lower setting applies a lower level of compression but a higher bit rate.
- 1d **Bit rate** — Enter a value of up to 300.000 Mbps to set the limit for the total bit rate for all data; image, audio, and audio. This control is not available for editing when the Control mode is set to **None**.

Advanced Controls panel

Click the **Advanced** button in the Bandwidth Management panel to access this panel. The controls in this area provide the complete set of VNC 325 image quality and bit rate tools (see figure 33). Some of the controls in the Bandwidth Management panel are duplicated here; when controls are duplicated, settings in one panel automatically track to the other panel.



Figure 33. Advanced Controls Panel

The panel is divided into two main categories:

- Video Quality (spatial compression) settings
- Bandwidth settings

Video Quality Management

- ①a **Luminance** — This control sets the level of luminance spatial compression, from 0 (minimum compression) to 10 (maximum compression).
- ①b **Chrominance** — This **normally locked** field shows the level of chrominance spatial compression, from 0 (minimum compression) to 11 (maximum compression). When locked, chrominance is directly related to the Luminance control by an offset value of 2.

NOTES:

- To manually set the chrominance compression, uncheck the Lock ☐ check box.
- A value of 2 is the optimal offset between luminance and chrominance.
- Settings of 4 (Luminance) and 6 (Chrominance) provide visually lossless compression for HD content.
- By default, the offset between Luminance and Chrominance is set to 2 whenever the Advanced controls panel is hidden (the Bandwidth Management controls panel Standard button is clicked).

Standard

- ①c **Temporal Compression mode check box** — Applies temporal compression to the bandwidth management, causing data to be transferred only when a change occurs between frames. This box is selected by default and should always remain selected.
- ①d **Refresh Rate** — Controls how frequently the non-changing parts of the screen are updated when temporal compression mode is enabled (the **Temporal Compression** check box is selected). This is useful when connecting new displays to a multicast source and to fill in gaps in the data when using a lossy network transport such as RTP. A value of 1 refreshes the screen in one second, a value of 0.1 refreshes the screen 10 times per second. A value of 0 disables the refresh.
- ①e **Threshold** — The threshold setting modifies the detection point of the temporal compression algorithm. A value of 0 results in all changes between frames being sent. As the threshold value is increased, only changes above a certain level are sent, thus reducing the bit rate. As a general rule, always set this to a 1 for a camera originated image.

NOTE: Threshold compensates for image sources that have a level of noise in them. In general, there is always a certain amount of noise in any source that is produced by an analog method. By applying a threshold, this noise can effectively be ignored by the PURE3 compression engine, resulting in a lower transmitted bit rate.

- ①f **Chroma check box** — The Chroma setting adapts the temporal compression to note the chroma changes in an image. When enabled, chroma thresholding increases the bit rate. This setting should be selected for video sources.

Bandwidth Management

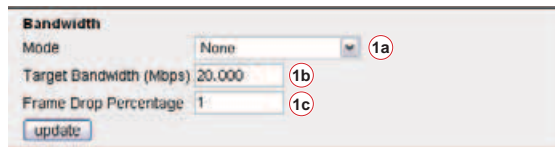
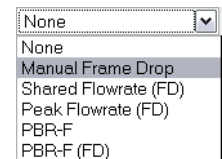


Figure 34. Bandwidth Portion of the Advanced Controls Panel

- ①a **Mode** — This drop down box is a set of six modes that apply different spatial and temporal compression schemes to manage the encoded image data stream. See “**Typical bit rates**” for suggested mode selections.



NOTE: Two of these control modes are available only from this panel. Four are also accessible in the Bandwidth Management controls panel settings panel.

- **Manual Frame Drop** — In this mode, the spatial image quality is held constant. However, the bit rate is managed by reducing the number of frames that are transported. The frame rate is managed by setting a value for the Frame Drop Percentage (see **item 1c**, below).
 - **Shared Flowrate** — This mode is the same as the Peak flow rate but the bit rate control is applied to the aggregate value for all streams from the encoder, as would be the case if multiple (maximum 4) Unicast RTP streams are chosen as the data transport method.
 - **None** — See the Control mode drop-down box in “**Bandwidth Management standard controls panel.**”
 - **Peak Flow** — See the Control mode drop-down box in “**Bandwidth Management standard controls panel.**”
 - **PBR-F** — See the Control mode drop-down box in “**Bandwidth Management standard controls panel.**”
 - **PBR-F (FD)** — See the Control mode drop-down box in “**Bandwidth Management standard controls panel.**”
- ①b **Target Bandwidth (Mbps)** — This value duplicates the Bit rate control in the Bandwidth Management controls panel. Enter a value of up to 300.000 Mbps to set the limit for the total bit rate for all data; image, audio, and audio. This control is not available when the Control mode is set to either **None** or **Manual Frame Drop**.
- ①c **Frame Drop Percentage** — This is the percentage of frames that are dropped whenever the manual frame drop is the chosen control mode. See “**Typical bit rates**” on the next page to see the estimated bit rates for various video, audio, and error correction selections.

Typical bit rates

This section provides estimated bit rates for various video, audio, and error correction selections and suggested mode (see “Bandwidth Management”, [item 1a](#)), selections.

The maximum supported bit rate is 300 Mbps, which is the total combined bit rate for video, audio, and error correction data. The streams information area (figure 32, [item 1a](#)) of the bandwidth management standard controls panel shows the total transport bit rate as adjustments are made to compression and FEC.

Table 7. Typical Video Bit Rates

	Application	<ul style="list-style-type: none"> Broadcast contribution Camera panning Sports and nature Lifestyle 	<ul style="list-style-type: none"> Broadcast news media gathering Static camera frame Interviews 	<ul style="list-style-type: none"> Static camera frame Surveillance Telepresence Collaboration Video phone
	Profile	<ul style="list-style-type: none"> High detail High motion 	<ul style="list-style-type: none"> High detail Low motion 	<ul style="list-style-type: none"> Low motion No motion
	Suggested Mode (2g)	PBR-F	PBR-F (FD)	Peak flow rate
	Resolution			
	SDI	10 to 20 Mbps	3 to 10 Mbps	500 kbps to 3 Mbps
	HD-SDI	50 to 90 Mbps	15 to 50 Mbps	2 to 15 Mbps
	3G-SDI	100 to 180 Mbps	30 to 100 Mbps	4 to 30 Mbps

The VN-Matrix 325 supports the transport of the audio data that is embedded in the video transport. Audio is available in blocks of 4 channels, with a bit rate of 2.43Mbps per pair in stereo mode. Forward error correction, which implements the recommendations defined by PRO-MPEG COP3, can be added to the audio stream to correct for packet drops on the network. Be aware, though, that forward error correction can add up to 50-percent to the bit rate overhead.

Table 8 defines the audio bit rates in Transparent mode.

Table 8. Typical Embedded Audio Bit Rates in Transparent Mode

	1 group (4 channels)	2 group (8 Channels)	3 group (12 channels)	4 group (16 Channels)
Audio bit rate	16 Mbps	32 Mbps	48 Mbps	64 Mbps
FEC overhead (Example at 40%)	6 Mbps	12 Mbps	18 Mbps	24 Mbps
Total audio + FEC	22 Mbps	44 Mbps	66 Mbps	88 Mbps

The audio bit rate for Stereo mode is 2.3 Mbps. This can be further reduced with compression (see “[ANC \(Audio\) Panel](#)”) and [item 2c](#).

Table 9. Maximum bit rates

Application	<ul style="list-style-type: none"> Broadcast Contribution Camera panning Sports and nature Lifestyle 	Video Bit rate	Audio bit rate (1 group + 40% [error correction])	Total (max)
Resolution	SD	10-20 Mbps	22 Mbps	42 Mbps
	HD	50 to 90 Mbps		112 Mbps
	3G	100 to 180 Mbps		202 Mbps

Decoder Display and Configuration Page

To access the decoder display and configuration page (see figure 35), click the display icon on the device page.

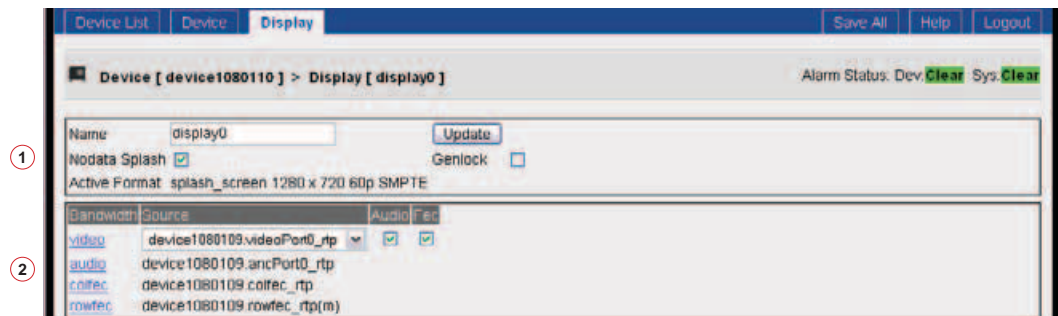


Figure 35. Decoder Display and Configuration Page

The available controls consist of two main panels:

- ① **Decoder video configuration controls** — Provides controls for the display name and the splash screen display and displays the active format (see “**Decoder Video Configuration Panel**”, below).
- ② **Decoder streams configuration controls** — Provides control for stream selection (see “**Decoder Streams Configuration Panel**”) and a link to the bit rate and stream statistics page.

Decoder Video Configuration Panel



Figure 36. Decoder Video Configuration Panel

- ①a **Name field** — This is the name that is displayed in the device list page. This can be changed to any value.
- ①b **Nodata splash checkbox** — Enables the display of a splash screen when the display device detects a break in the input data stream. When this control is disabled the last decoded frame is displayed.
- ①c **Genlock checkbox** — Enables a local SDI input of the same refresh rate as the streamed video to act as a digital genlock signal for synchronizing the decoder to a local standard.
- ①d **Active format** — Reports the currently selected output mode. The reported mode is the source type. If no source is available, the splash screen resolution is reported.

For each change made, click the **Update** button to confirm the change.

Update

Decoder Streams Configuration Panel

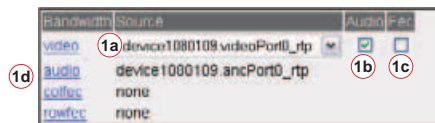


Figure 37. Decoder Streams Configuration Panel

For each change made in the decoder streams configuration panel, click the **Update** button in the video configuration panel to confirm the change.

Update

①a **Source stream selection** — You can view the available active source (streams) by opening the **Source** drop down box.

- Choose **rtp(m)** for multicast RTP streaming.

NOTE: **rtp(m)** is available only if you have enabled multicast streaming. See “**Enable multicast streaming**” in the “Installation and Setup” section.

- Choose **rtp** for unicast RTP streaming.
- Choose **tcp** for unicast TCP streaming.

NOTE: See “**Data Transport Methods**” in the “Installation and Setup” section for more information.

You can define the names by renaming the appropriate encoder device.

①b **Audio checkbox** — Enable or disable the transport of the audio content associated with the selected video stream (the audio stream) by selecting the **Audio** check box. If enabled, the selected audio stream is listed adjacent to the **audio** heading in the bandwidth list. If **Audio** is not enabled, the display is **none**.

①c **Fec checkbox** — Enable or disable the transport of the row (rowfec) and column (colfec) content associated with the selected video stream by selecting the **Fec** check box.

If enabled, the selected error correction streams are listed adjacent to the **rowfec** and **colfec** headings in the bandwidth list. If **Fec** is not enabled, the display is **none**.

NOTES:

- The encoder send error correction data only when it is enabled for processing by a decoder.
- Error correction data is sent only for the audio stream.

①d **Bandwidth links** — Click any of the Bandwidth links, **video**, **audio**, **colfec** (column error correction), or **rowfec** (row error correction), to open the “**Decoder Bit Rate and Streams Page**”, described on the next page.

Decoder Bit Rate and Stream Page

To view the bit rate and statistics for one of the incoming streams (video, audio and error correction), open the decoder bit rate and streams page for that stream (see figure 38) on the decoder display and configuration page. Click the desired [Bandwidth](#) link, **video**, **audio**, **colfec** (column error correction), or **rowfec** (row error correction).

[Bandwidth](#)
[video](#)
[audio](#)
[colfec](#)
[rowfec](#)

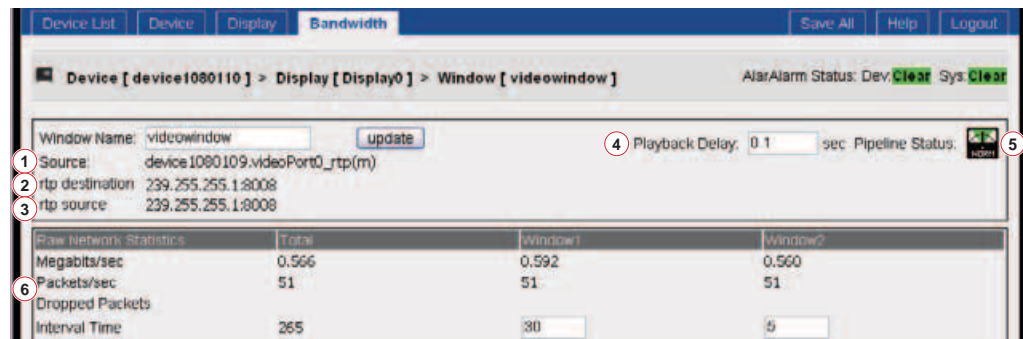


Figure 38. Decoder Bit Rate and Stream Page

- NOTES:**
- The bit rate statistics reported on this page apply to the stream type you selected. This display is different from the bit rate statistics reported by the encoder, which is for the total of all stream types.
 - This section is specific to the video data stream. Note that the scheme for audio and error correction data is the same.

- ① **Source:** — Reports the currently select stream.
- ② **rtp destination** — Reports the IP destination address and port for the current stream. When connecting using RTP this is either a multicast group address or, for RTP unicast, the IP address of the decoder. When connecting using TCP, this field displays 0.
- ③ **rtp source** — Reports the multicast group address to which reception statistics are reported. In RTP unicast and TCP modes this field reports the IP address of the encoder.
- ④ **Playback Delay field** — Defines the playback delay, the sum of the transit time in the network and the time spent in the input buffer of the decoder. You can modify this setting. Use the Pipeline Status indicator (⑤) as a guideline for the correct value.
 - Setting the Playback Delay to too small a value can result in the decoder input buffer emptying faster than data arrives (underflowing). The playback image jumps as network loading changes occur.
 - Setting the Playback Delay to too large a value can result in the decoder input buffer filling more quickly than data can be processed (overflowing). The increase in image latency can result in an internal buffer overflow on high bandwidth data streams, a jumpy screen update, and screen flashing.

The Playback Delay setting should be set to a value between 0.1 and 0.2 seconds.
- ⑤ **Pipeline Status indicator** — Indicates the status of the input buffer in the decoder. Adjust the Playback Delay (④) so that the meter sits at the mid point.
 - If the meter swings left, it indicates that the buffer is underflowing.
 - If the meter swings right, it indicates that the buffer is overflowing.

- ⑥ **Raw Network Statistics panel** — Reports the bit rate and network statistics for the current stream (see figure 39).

	a	b	c
Raw Network Statistics	Total	Window1	Window2
6a Megabits/sec	0.565	0.592	0.560
6b Packets/sec	51	51	51
6c Dropped Packets			
6d Interval Time	255	30	5

Figure 39. Raw Network Statistics Panel

- a **Total column** — Contains items 6a through 6c data accumulated for the history of the stream.
- b **Window1 and Window2 columns** — Contain items 6a through 6c data accumulated over user programmable intervals and allows you to set the interval (item 6d) for that column.

- 6a **Megabits/sec row** — Displays the bit rate received from the current data source.

NOTE: The reported bit rate in figure 39 is for the video stream **only**. See “**Typical bit rates**” on page 46 to estimate values for the Audio and error correction streams.

- 6b **Packets/sec row** — Displays the number of data packets per second received from the source.
- 6c **Dropped packets row** — Displays the number of data packets dropped during the associated interval time. Dropped packets are counted when using RTP streams on busy networks.
This row is always 0 for TCP streams.
- 6d **Interval Time row** — The user-programmable time, in seconds, over which the Window1 and Window2 data is averaged.
The Total column assumes an infinite interval time.

Peripherals Page and Serial Port Control

The VN-Matrix units can pass bidirectional serial (RS-232) data or control signals, such as for serial control of a projector, across the network. See “[RS-232 Over LAN Port](#)” and “[Serial Port Wiring](#)” in the “Installation section”. Serial data is sent independently of the other streams on the network and it is not necessary to have a direct encoder to decoder relationship.

In Pass-through Control Mode (see figure 40), serial data is passed from one VNC 325 to another. Data flow is fully bidirectional and is independent of whether the VNC 325 is an encoder or decoder. Thus, control of external equipment is supported.

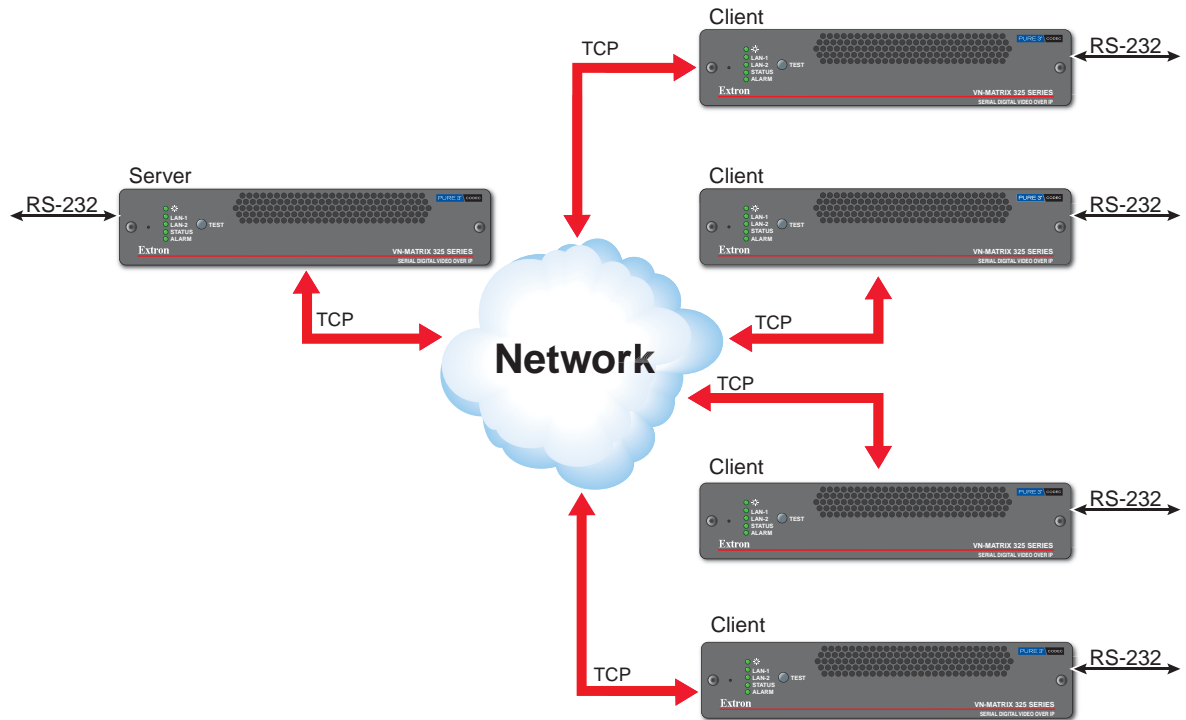


Figure 40. Pass-through Control

One VNC 325 device must be designated the server. All other VNC 325 devices are then configured as clients.

Data that is input to the server is sent to all clients simultaneously. Data that is received at a client is sent to the server. Simultaneous data transfers are processed on a first in first out basis. Any number of pass-through groups can exist on the same network. Communication can only take place between a client and a server; one client cannot communicate with another.

Configuring a Serial Pass-through Group

NOTE: The client and server ends of the serial pass-through connection do not have to have the same baud rate settings, however having the different ends at vastly different rates can result in unexpected results.

1. Decide which device is to be the server.
2. On the device list page (see **figure 23** on page 32), click on the device you want to configure.
3. On the device page (see **figure 25** on page 34), click the **peripherals** tab.
4. On the peripherals page (see ① on **figure 41**), set the mode to either **server** or **client**.

If you select client, the destination drop-down box (③) appears.

Configuring the Server

Device List | Device | **Peripherals**

Device [device1080109] > Peripheral Configuration

Serial Port Control

mode: server (1) (4) update

baud rate: 115200 (2)

data bits: 8 (2)

stop bits: 1 (2)

parity: odd (2)

handshake: none (2)

Configuring a Client

Device List | Device | **Peripherals**

Device [device1080110] > Peripheral Configuration

Serial Port Control

mode: client (1) (4) update

baud rate: 115200 (2)

data bits: 8 (2)

stop bits: 1 (2)

parity: odd (2)

handshake: none (2)

destination: passthrough.device1080109.port2 (3)

Figure 41. Configuring a Serial Pass-through Group

5. Configure the baud rate, data bits, stop bits, parity, and handshake settings as required (②).
6. In the destination drop-down box, select **passthrough** for the appropriate server (③).
7. Click the **update** button (④).
8. Repeat steps 2 through 7 for all
9. Click the **Save All** tab to save the changes.

Save All

NOTE: If you do not click **Save All**, the settings are lost when power is cycled on and off.

Firmware Upgrade Page

Extron may occasionally issue firmware upgrades for the VNC 325. See the Extron website, www.extron.com, for details of the latest firmware release. Upgrades are supplied in a single file, "upgrade_verx.x.tar", where verx.x is the version number. Copy the upgrade file onto the computer that you use to access the VNC 325 unit that is designated as the controller.

Firmware upgrade is a multi-stage process, highlighted in table 10 and figure 42. The detailed procedure begins on the next page. Extron recommends that all VNC 325 units in the system be upgraded to the same firmware version to ensure full compatibility.

Table 10. Firmware Upgrade Stages

Stage	Function Summary	Perform on
Upload	Copy the upgrade file from the control PC to a temporary storage area on the controller.	The controller VNC 325 only
Prepare	Unpack and copy the upgrade into all units.	All VNC 325s
Activate	Activate the upgrade in temporary mode. It can be abandoned if problems occur.	All VNC 325s
Commit	Permanently commit to the upgrade.	All VNC 325s

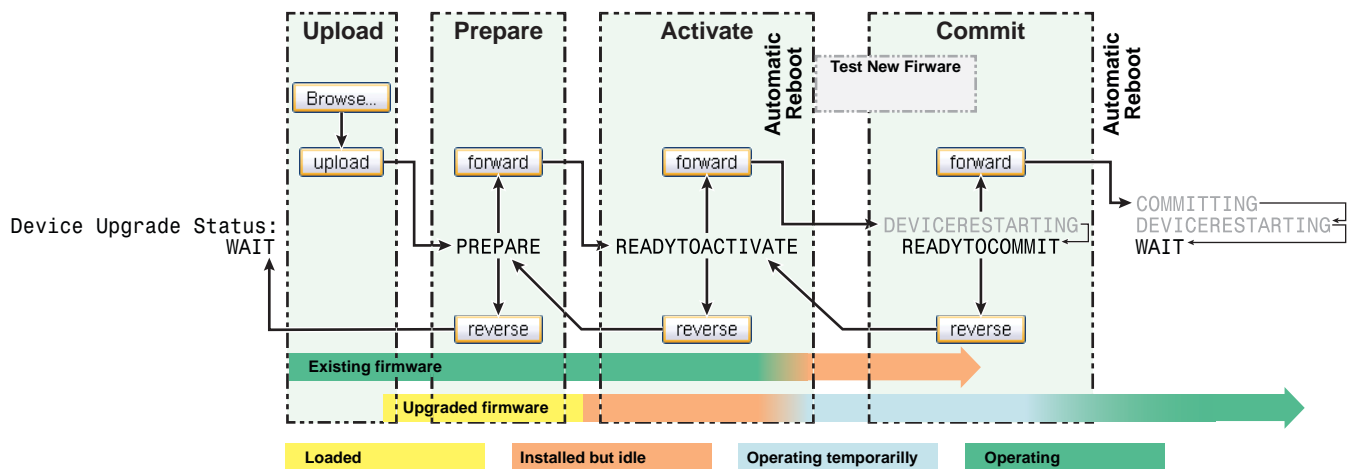


Figure 42. Temporarily Installing, Testing, and Permanently Installing New Software

The process allows you to temporarily install and test the new firmware and, if everything is OK, you can then permanently install (commit) the new firmware. Up until the last stage it is possible to return to the existing firmware version.

- NOTES:**
- The *activate* and *commit* stages reboot the controller. This results in two considerations:
 - The upgrade file in the temporary storage area of the controller codec is erased. Extron recommends that you:
 - Prepare* all devices first (the upgrade page displays the READYTOACTIVATE message).
 - Then *activate* the upgrade on each device (the upgrade page displays the READYTOCOMMIT message), starting with the controller VNC 325.
 If you inadvertently *activate* the upgrade in the controller codec before all devices are prepared, *upload* the file again (see below).
 - There is a temporary loss of the network interface. Wait 30 seconds to allow the VNC 325 to reboot, then refresh the browser.
 - Perform the *activate* stage on the controller codec first to ensure that the new firmware controls the upgrade of the remaining devices. Extron recommends that you *activate* all devices (the upgrade page displays the READYTOCOMMIT message) before *committing* to the controller upgrade.

Uploading the upgrade to the controller codec

Upload the file to a temporary storage area on the controller VNC 325 in accordance with the procedure below. From this location, it can be installed on all codecs in the system.

- Login to the network interface (see “**Startup and Login**” in the “Installation and Setup” section).
- On the device list page, click anywhere on the row (except the Delete column) for the controlling VNC 325 to select that codec to receive the firmware upload (① on figure 43).

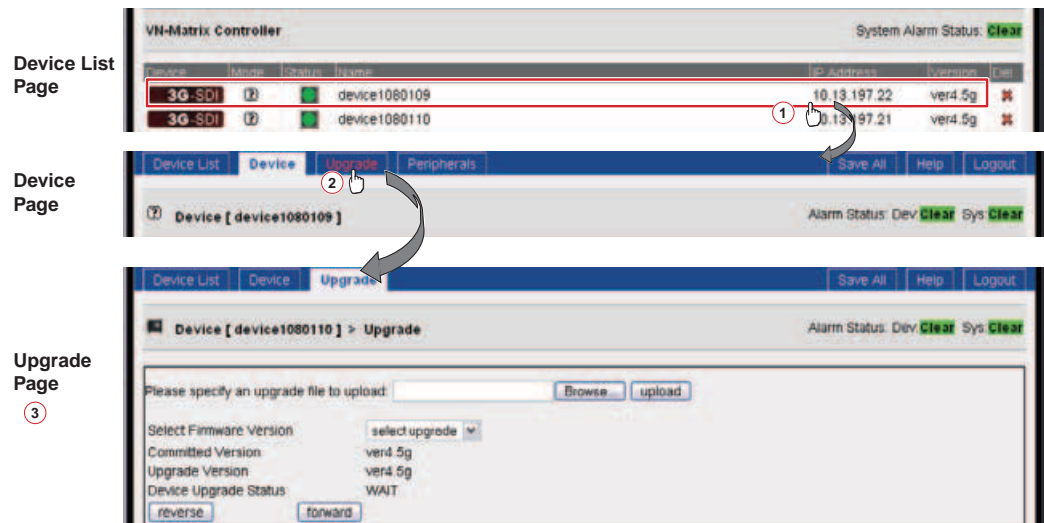


Figure 43. Upgrade Page

- On the device page, click the **Upgrade** tab (②). The upgrade page appears (③). The page includes the following drop-down box and data fields:
 - Select Firmware Version drop-down box** — Selects the version to be used.
 - Committed Version field** — Displays the currently loaded and running version.
 - Upgrade Version field** — Displays the version to which you are upgrading.
 - Device Upgrade Status** — Reports the status of the upgrade process. At this point in the upload procedure, it reports WAIT.

4. Click the **Browse** button (①). The File Upload window (see figure 44) opens.

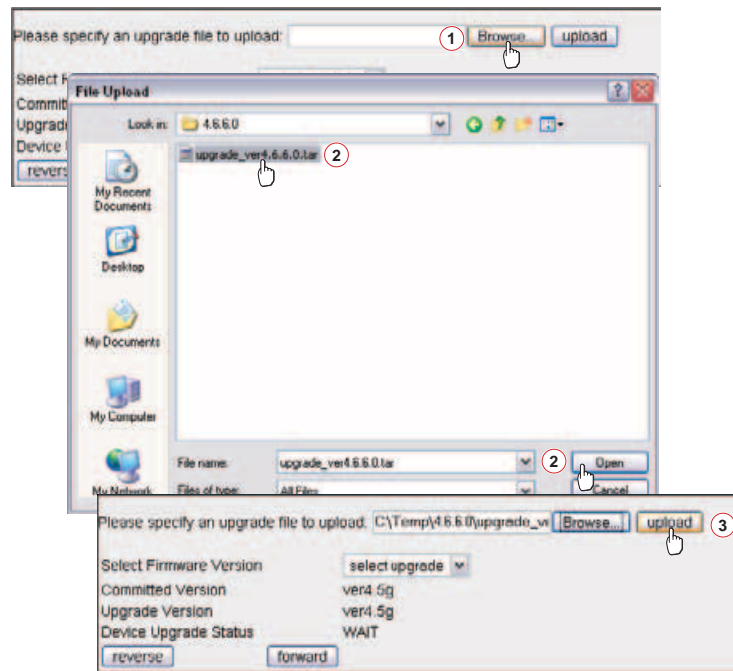



Figure 44. Upload a Firmware File to the Controller Codec

5. Navigate to the folder where you saved the firmware upgrade file, select the file, and click the **Open** button (②). The File Upload window closes.
6. On the upgrade page, click the **upload** button (③). The selected file is uploaded to a temporary memory area in the controller. This can take a few moments.  A status bar at the bottom of the upgrade page shows the status of the load. The status bar closes and the Upgrade Version field displays the new value.
Upgrade Version ver4.6.6.0

The controller can hold a maximum of two upgrade files. If another is loaded then the oldest file is deleted.

Installing the firmware (prepare, activate, and commit stages)

Once the file is uploaded, unpack and copy the new firmware (from the controller) into the VNC 325 alternate flash memory of each unit, starting with the controller unit.

1. Open the upgrade page (see “**Uploading (Copying the Upgrade to the Controller Codec)**”, steps 2 and 3, **except** select the codec on which you want to install the upgrade, which may or may not be the controller codec).
2. Click the **Select Firmware Version** drop-down box (① on figure 45) and click the firmware file you want to install. Usually only one is file listed.

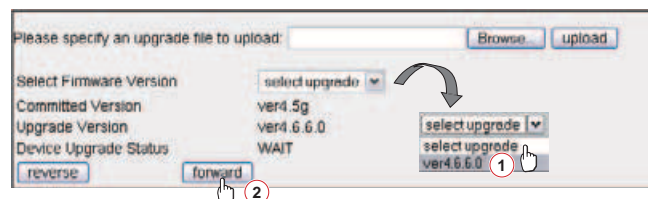


Figure 45. Prepare an Upgrade in a Codec

NOTE: The remainder of the installation procedure is performed using the forward button to advance the installation through the various stages. If necessary, the reverse button can back up a stage. The Device Upgrade Status field indicates the current stage or the status.

The process lets you temporarily install and test the new firmware and, if it behaves satisfactorily, permanently install (commit) the new firmware. Up until the last stage, you can return to the existing firmware version.

Figure 42 summarizes the process.

3. Click the **forward** button (②). The Device Upgrade Status field shows **PREPARE** and the percentage of progress.

Device Upgrade Status PREPARE 51%

This stage may last a few minutes. When it is complete, the Device Upgrade Status field shows **READYTOACTIVATE**.

4. Click the **forward** button.

The unit reboots. The VNC 325 is using the new firmware and the Device Upgrade Status field shows **READYTOCOMMIT**.

5. Test the system for correct operation.

6. If everything is working correctly, click the **forward** button. The Device Upgrade Status field shows **Committing** and the percentage of progress.

Device Upgrade Status COMMITTING 37%

This stage may last a few minutes. When it is complete, the Device Upgrade Status field shows **WAIT** and the Committed Version field displays the upgrade you just successfully committed.

NOTE: If you experience any problems, click the **reverse** button to return to the end of the activating stage (**READYTOCOMMIT** display).

7. Repeat steps 1 through 6 for each codec.

License Page

Each VNC 325 codec is supplied with a feature set that is defined by its license key and structure. The key and structure are not changed as part of normal operation; this information is provided for reference only.

The system controller can be licensed to add or remove features. The license is entered when the unit is manufactured and users should not attempt modify this in any way. If you do modify these fields, the unit may become unstable.

Accounts Page (Passwords and Clock Management)

To access the accounts page (see figure 46), click the **Accounts** tab on the device list page. The accounts page consists of the passwords panel, the clock management panel, and the controller licensing panel.

Accounts

Figure 46. Accounts Page

Passwords Panel

The VN-Matrix 325 system has three user accounts, all shown and changeable on the passwords panel (see figure 47):

- **Administrator** — Allows full read/write access to all setup parameters.
- **Public Account** — Allows read only access to setup parameters.
- **Recorder GUI Account** — Allows full read and write access to all setup parameters for the VNM Recorder.

NOTE: The VNM Recorder is not documented in this guide. Inclusion in this list is for completeness and reference only.

Figure 47. Passwords Panel

Change a password as follows:

1. Enter the existing password in the **Current Password** field for the account that you want to change (① on figure 47).
2. Enter the new password in both the **New Password** and **Confirm** fields for the account that you want to change (②).

NOTES:

- The password can include letters, numbers, and the underscore character. The password is case-sensitive.
- As shipped from the factory, the password for both user names is the same as the name itself (the password is “admin” for the admin user name and “public” for the public user name).

3. Click the **Update Password** button to save the change (③).

The new password is required the next time you login.

Clock Management Panel

The unit that is designated as the controller generates the system clock. All units in the system receive their time stamps from the system controller.

The clock for all VNC 325 units can be changed to reflect the local time as follows:

1. Entering the local time in the **New Time** field in the format yyyy-mm-dd hh:mm:ss (see ① figure 48).

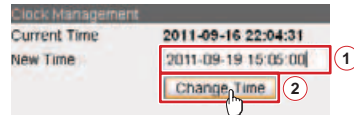


Figure 48. Clock Management Panel

2. Click the **Change Time** button (②).

Controller Licensing Panel

The fields on this panel are set when the unit is manufactured and users should not attempt modify them in any way.

CAUTION: If you do modify these fields, the unit may become unstable.

Alarms and SNMP


This section provides a detailed examination of VNC 325 alarm conditions and its handling of Simple Network Management Protocol (SNMP).

This section includes the following:

- **Alarms**
- **Simple Network Management Protocol**

Alarms

The VNC 325 generate alarms for range of error conditions, defined in the “**Alarm types and descriptions**” section. Alarms can be monitored at a number of locations throughout the network interface as identified below:

- **Alarms page** (see figure 49, below) — The list immediately beneath the filter settings panel details the alarm conditions that are currently active on the system.
- **Alarm Logs page** (see figure 51) — This page provides a historical log of when an alarm condition was raised and cleared.
- **Device list page** (see figure 16) — A “traffic light” symbol in the Status column represents the status of a device. 
- In the top right hand corner of each network interface page — System Alarm Status: **Warning**
The device status and system status is displayed.

In addition, the red LED located on the front panel of the codec illuminates whenever a **critical** alarm is triggered.

Alarm conditions, once triggered, remain active until 5 seconds **after** the error that caused it has cleared.

Alarms Page

The alarms page (see figure 49) lets you monitor system alarms and define what is and is not an alarm condition.

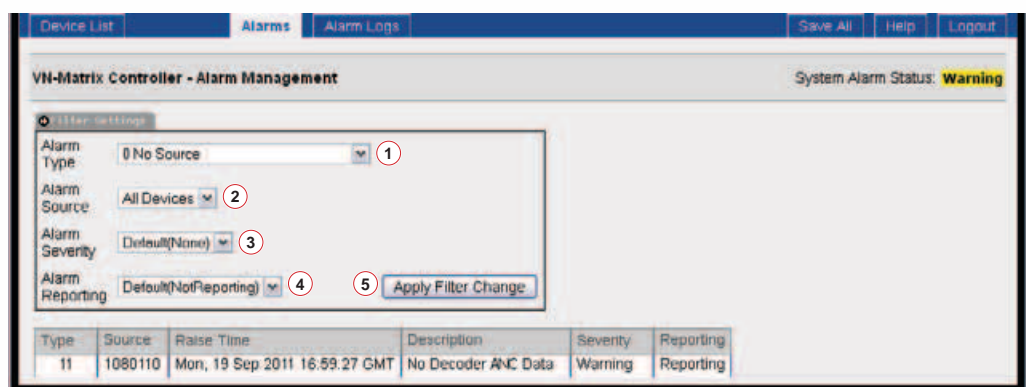


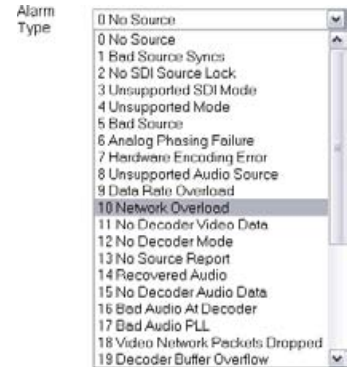
Figure 49. Alarms Page

Filter settings panel

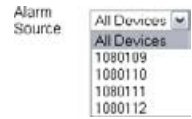
The Filter Settings panel (see [figure 49](#), on the preceding page) allows you to modify the default settings for each alarm type.

- ① **Alarm Type** — Selects an alarm for which you want to change its default settings. This drop-down box lists the available alarm error conditions for all units. Alarm error conditions are divided into three categories

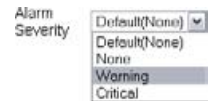
- Alarm errors that occur on an encoder (see [table 11](#)) on page 61.
- Alarm errors that occur on a decoder (see [table 12](#)) on page 62.
- One alarm error that occurs only on the device that is configured as the system controller (see [table 13](#)) on page 62.



- ② **Alarm Source** — Select the device for which you want to change its default settings. Alarm filters can be set for either a single, specific unit or for all VNC 325 devices in the system.



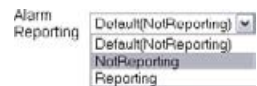
- ③ **Alarm Severity** — Set the alarm severity. Each alarm condition has a default severity which can be overwritten using the filter controls. Note that the default setting is listed in this drop down independently of any changes that have been made to the alarm severity.



Alarms can be set to one of three severities, as listed in the table below:

Alarm Severity	Description
Critical	When triggered, a critical alarm: <ul style="list-style-type: none"> • Illuminates the red LED on the front panel of the affected unit. • Closes the normally open contacts and opens the normally closed contacts of the relay accessed via the RS-232 Over LAN port. • Displays the red traffic light indicator for the device on the device list page.
Warning	When triggered, displays the yellow traffic light indicator for the device on the device list page.
None	Effectively filters the alarm condition; it still appears in the alarms list but it does not display any colored indicators.

- ④ **Alarm Reporting** — Set the alarm to be either **Reporting**, **NotReporting**, or **Default** (the default setting for the alarm condition, which could be either reporting or not reporting). A **Reporting** condition causes the encoder to send an SNMP trap (an asynchronous notification) to an SNMP client whenever that alarm condition is triggered.



The default setting is listed in this drop down independently of any changes that have been made to the alarm reporting.

- ⑤ **Apply filter change button** — Click the **Apply filter change** button to temporarily apply the alarm changes.



NOTE: Click the **Save All** tab to permanently save the alarm settings. Changes are lost after a power cycle unless you **Save all**.



Alarm list panel

The alarm list panel (see figure 50) provides information on all alarm events that are currently active.

Type	Source	Raise Time	Description	Severity	Reporting
0	1080110	Mon, 19 Sep 2011 16:59:27 GMT	No Source	Critical	Reporting
21	1080109	Mon, 19 Sep 2011 16:59:31 GMT	Bad Video PLL	Warning	Reporting

Figure 50. Alarm List Panel

Alarm events that are listed can be sorted by **Type**, **Raise Time**, and **Severity**. Position the mouse over the desired sorting heading and left-click to change the list order.

The list is refreshed each time that you click the **Alarms** tab or change the sorting criteria.

Alarm types and descriptions

Table 11. Encoder Alarm Type and Description

	Alarm Type	Description	Action	Default Settings
Encoder Alarm	No source	No source is present at the input.	Check the input connection; is there an output on the loop through connector?	Critical, reporting
	Bad source syncs	Source is present, unrecognized due to bad sync measurement.		Critical, reporting
	No SDI source lock	Source is present, unable to lock.		Critical, reporting
	Unsupported SDI Mode	Source is present, mode is not supported.		Critical, reporting
	Unsupported Mode	Not applicable to VNC 325.		N/A
	Bad Source	Not applicable to VNC 325.		N/A
	Analogue Phasing error	Not applicable to VNC 325.		N/A
	Hardware encoding error	The hardware is unable to encode the input signal.		Critical, reporting
	Unsupported audio source	Not applicable to VNC 325.		N/A
	Data rate overload	The compressed data rate is too high.	Increase the compression or reduce the required bit rate	Critical, reporting
	Network overload	The network is dropping too many packets.		Warning, reporting

Table 12. Decoder Alarm Type and Description

	Alarm Type	Description	Action	Default Settings
Decoder Alarm	No decoder video data	Indicates that there is a valid connection, no video data present. Usually accompanied by no source data stream message in the web interface.		Warning, reporting
	No decoder mode	No matching decoder mode for the incoming stream.		Warning, reporting
	No source report	Unable to detect the format of the received data stream.		Warning, reporting
	Recovered audio	Not applicable to VNC 325.		N/A
	No decoder audio data	Not applicable to VNC 325.		N/A
	Bad audio at decoder	Not applicable to VNC 325.		N/A
	Bad audio PLL	Not applicable to VNC 325.		N/A
	Video network packets dropped	Excessive network packet loss has occurred.		Warning, reporting
	Decoder buffer overflow	The incoming data rate is high; reduce the pipeline delay.		Warning, reporting
	Decoder buffer underflow	The incoming data rate is too low; increase the pipeline delay.		Warning, reporting
	Bad video PLL	The decoder cannot synchronize to the video data.		Warning, reporting
	No decoder ANC data	The decoder is not receiving any embedded audio (ancillary) data.		Warning, reporting
	Missing ANC at decoder	The decoder is receiving poor quality Anc data.		Warning, reporting
	Recovered ANC	Error correction has recovered corrupted / missing Anc.		Warning, reporting

Table 13. Controller Alarm Type and Description

	Alarm Type	Description	Action	Default Settings
Controller Alarm	Bad device	The controller is unable to contact the specified device. The device is not available or has failed.	Check the device in question: <ul style="list-style-type: none"> • Has the unit been removed? • Is power applied? • Are the network cable and connection present? 	Critical, reporting

Alarm Logs page

The alarm logs page (see figure 51) provides a historical list of the last 200 alarm events.

Device List | Alarms | Alarm Logs | Save All | Help | Logout

VN-Matrix Controller - Alarm Management System Alarm Status: **Critical**

Filter Settings

Snmp Trap Version: v2c Update

Snmp Community: public

Snmp Trap Destinations: Create Trap Destination Delete Trap Destination

Type	Source	Raise Time	Clear Time	Description	Severity
22	1080109	-	Mon, 19 Sep 2011 16:59:31 GMT	Bad Device	Critical
22	1080110	-	Mon, 19 Sep 2011 16:59:31 GMT	Bad Device	Critical
22	1080112	-	Mon, 19 Sep 2011 16:59:27 GMT	Bad Device	Critical
22	1080111	Mon, 19 Sep 2011 16:59:16 GMT	-	Bad Device	Critical
22	1080109	Tue, 20 Sep 2011 16:48:51 GMT	-	Bad Device	Critical
22	1080109	Tue, 20 Sep 2011 16:49:31 GMT	-	Bad Device	Critical
22	1080109	Tue, 20 Sep 2011 16:49:48 GMT	Tue, 20 Sep 2011 16:49:58 GMT	Bad Device	Critical
20	1080111	Tue, 20 Sep 2011 16:50:17 GMT	Tue, 20 Sep 2011 16:50:27 GMT	Decoder Buffer Underflow	Warning
21	1080109	Tue, 20 Sep 2011 16:50:33 GMT	Tue, 20 Sep 2011 16:50:43 GMT	Bad Video PLL	Warning
20	1080112	Tue, 20 Sep 2011 16:51:02 GMT	Tue, 20 Sep 2011 16:51:01 GMT	Decoder Buffer Underflow	Warning

Clear Logs

Figure 51. Alarm Log Page

The log provides data on when an alarm error condition was raised and cleared. Each event is paired in the log so a raise and clear event is listed together. When more than 200 events occur, the oldest event is deleted from the log.

Alarm events that are listed can be sorted by **Type**, **Raise Time**, and **Severity**. Position the mouse over the desired sorting heading and left-click to change the list order. The list is refreshed each time that you change the sorting criteria.

Click the **Clear Logs** button to erase all logged alarm data.

Clear Logs

Simple Network Management Protocol

NOTE: SNMP is an internet-standard protocol for managing devices on IP network and a component of the Internet Engineering Task Force (IETF) Internet Protocol Suite.
It is not the intent of this guide to define SNMP further than this and this section is intended for users who are familiar with SNMP protocol.

The VN-Matrix 325 system can report alarm events via an SNMP trap, providing simple integration with network management systems (NMS).

- When communicating using SNMP, the VN-Matrix 325 system complies with the requirements of SNMP v3.
- When generating SNMP traps, the VN-Matrix 325 system complies with the requirements of SNMPv1 or SNMPv2C (user-selectable using the SNMP filter settings panel on the alarm logs page [see figure 52]).



Figure 52. SNMP Filter Settings Panel

SNMP variables that you may need to change include:

- The SNMP password
- The SNMP community value
- SNMP trap destination values

SNMP Password Value

The SNMP password is the same as the administrator password. By default this is set to `admin`.

You must to enter the administrator password on the accounts page before SNMP can be used. This process must be carried out for each of the following circumstances:

- When first using the system
- After a firmware upgrade to the system

A password for SNMPv3 must be exactly eight characters long.

- If the administrator password is less than eight characters in length then the remaining characters are packed as follows: `admin` becomes `adminadm` (exclusive of the parentheses).
- If the administrator password is longer than eight characters then the value is concatenated: `concatenate` becomes `concaten` (exclusive of the parentheses).

NOTE: These password rules apply to the SNMP management software password only and have no effect on the network interface login.

SNMP Community Value

The SNMP community value, defined within the protocol, acts as a password. It authenticates messages between the VN-Matrix 325 system and the NMS. By default, the community string is set to `public`. This value can be changed, using the SNMP filter settings panel (see [figure 52](#)) on the alarm logs page. The community string must match that in use by the NMS; if not then it may not be possible to manage the VNC 325 device.

SNMP Trap Destination Values

The **Create Trap Destination** field in the SNMP filter settings panel (see [figure 52](#)) on the alarm logs page is used to add and remove destination IP addresses for NMS servers. Multiple destinations may be added.

Reference Information

This section discusses the specifications, part numbers, and accessories for the VNC 325 codec. Topics that are covered include:

- **Specifications**
- **Part Numbers and Accessories**
- **Mounting the Codec**
- **Test Pattern**

Specifications

Video

Signal type	SDI, HD-SDI, 3G-SDI digital video
Resolution	8 or 10 bits, automatic
Data rates	270 Mbps, 1.485 Gbps, 2.970 Gbps.
Operation standards.....	SMPTE 259M, SMPTE 296M, SMPTE 424M
Auto data rate lock	Yes

Video input and loop through — encoder

Number/signal type	1 digital component video with loop through 10 bit, 4:2:2, with auto-detection
Connectors	3 female BNC: 1 for input, 2 for loop through (1 with messaging overlay option)
Nominal level	0.8 Vp-p
Impedance	75 ohms
Data rates	1.5 Gbps to 3.0 Gbps
Vertical frequency.....	23.97 Hz to 60 Hz, depending on signal format
Resolution range	525i, 625i, 720p, 1080i, 1080p, 1080psf

Video processing — codec

Compression	PURE3® Codec
Frame rate delay.....	35 ms (70 ms encoding/decoding end-to-end)
Bit rate	6 Mbps to 250 Mbps
Bit and frame rate control	Selectable
Frame rate.....	Up to 60 fps @ 1080p

Video output — decoder

Number/signal type	1 digital component video 10 bit, 4:2:2, with auto-detection
--------------------------	---

NOTE: Output signal format follows the input format at the encoder.

Connectors	1 female BNC
Nominal level	0.8 Vp-p
Impedance	75 ohms
Vertical frequency.....	23.97 Hz to 60 Hz, depending on signal format

Resolutions..... 525i, 625i, 720p, 1080i, 1080p, 1080psf

Sync — genlock — decoder

External sync (genlock) 0.8 Vp-p (digital component video)
Genlock connector 1 female BNC
Output impedance 75 ohms
Vertical frequency 23.97 Hz to 60 Hz, depending on signal format

Audio input and output

Number/signal type 4 groups of 4 channels, embedded with video signal
Connectors 1 female BNC (shared with video input and output)

NOTE: Output mode (transparent pass-through or stereo) is user selectable.

Audio processing

Transparent pass-through mode (selectable)

Format..... Embedded audio (ANC) data is transported as received.
Compression..... None
Sampling rates and bit depth ... 48 kHz (synchronous)
20 or 24 bit digital audio
Standards SMPTE 299M, SMPTE 272M-A
Transmitted payload..... SDI: 8 Mbps per group of 4 audio channels
HD-SDI and 3G-SDI: 16 Mbps per group of 4 audio channels

Stereo mode (selectable)

Format..... PCM: a single stereo pair is transported.
AC3/Dolby Digital: 5.1 channels are transported.
Compression..... Sampling rate and bit depth decimation can be applied for uncompressed
PCM audio data.
16, 20, or 24 bit digital audio; full sampling rate
16 bit digital audio, half sampling rate
16 bit digital audio, quarter sampling rate
Sampling rates and bit depth ... 48 kHz
20 or 24 bit digital audio
Standards SMPTE 299M, SMPTE 272M-A
Transmitted payload..... 2.43 Mbps

Control — host ports — codecs, decoders

Serial host control port (1) RS-232, male 9-pin D connector (labeled "Remote") for VNC 325 configuration
Baud rate and protocol 115200 baud, 8 data bits, 1 stop bit, no parity, no flow control
Serial control pin configurations 1 = DCD, 2 = Rx, 3 = Tx, 4 = DTR, 5 = GND, 6 = DSR, 7 = RTS, 8 = CTS, 9 = ring
Ethernet control port 1 female RJ-45
1 female SPF IP module
Ethernet data rate 10/100/1000Base-T, half/full duplex with autodetect
Ethernet protocol ICMP (ping), IP, TCP, RTP, RTCP, UDP, DHCP, HTTP, SMTP, Telnet
System control VN-Matrix Enterprise Controller
VN-Matrix web server
Program control Extron Command Line Interface (CLI)
Microsoft® Internet Explorer® and other web browsers, Telnet

Control — serial port (RS-232 pass-through over LAN)

Serial control port (1) RS-232, male 9-pin D connector (labeled "RS-232 over LAN") for third party
device control across a network
Baud rate and protocol 115200 baud, 8 data bits, 1 stop bit, no parity, no flow control

Network transport

Ethernet data rate	10/100/1000Base-T, half/full duplex with autodetect
Ethernet protocol	
Streaming	RTP, RTCP
Transport	TCP, UDP (unicast or multicast)
All supported	ICMP (ping), IP, TCP, RTP, RTCP, UDP, DHCP, HTTP, SNMP V3, Telnet
Video input/output	PURE3® Codec compression
Audio input/output	Transparent pass-through or stereo, selectable

General

Power supply	External
	Input: 100-240 VAC, 50-60 Hz
	Output: 12 VDC, 3 A max.
Power consumption	30 watts nominal, 60 watts max., 12 VDC
Temperature/humidity	Storage: -40 to +158 °F (-40 to +70 °C) / 10% to 90%, noncondensing
	Operating: +41 to +95 °F (5 to +35 °C) / 10% to 85%, noncondensing
Cooling	Fan, vents front to back
Mounting	
Rack mount	Yes
Enclosure type	Metal
Enclosure	1.7" H* x 8.75" W x 12.2" D (1U high, half rack wide)
	(4.3 cm H* x 22.2 cm W x 30.9 cm D)
	*Height with feet is 2.1" (5.3 cm).
	(Depth includes connectors.)
Product weight	2.8 lbs (1.3 kg) each
Shipping weight	8 lbs (4 kg)
Regulatory compliance	
Safety	CE, c-UL, UL
EMI/EMC	CE, C-tick, FCC Class A, ICES, VCCI
Environmental	Complies with the appropriate requirements of RoHS, WEEE
Warranty	3 years parts and labor

- NOTES:**
- All nominal levels are at $\pm 10\%$.
 - Specifications are subject to change without notice.

Part Numbers and Accessories

Codec Part Number and Included Parts

Item	Part Number
VNC 325 codec	60-1249-01
12 VDC External power supply	28-113-07LF
Power supply cable assembly	27-795-01LF
Serial cable	
<i>VN-Matrix 325 Setup Guide</i>	

Mounting and Power Options

These items can be ordered separately:

Accessory	Part Number
RSU 129 9.5-inch deep universal rack shelf kit	60-190-01
RSB 129 9.5-inch deep basic rack shelf	60-604-02
MBD 149 1U Through-desk and rack mounting kit	70-077-03
MBU 149 Under-desk mount kit	70-222-01
VNM 12 PSR 12 Unit Power Supply with Redundancy	70-762-01
VNM 12 PS 12 Unit Power Supply	70-763-01

Optional SFP Module

LAN port 2 is an SFP (mini-GBIC) Gigabit slot that accepts a copper or optical SFP compatible transceiver. This part is not included with the codec and can be acquired locally. Contact the Extron S3 Sales & Technical Support Hotline if you have questions. See the contact numbers on the last page of this guide for the Extron office nearest you.

Cables

Cable	Part Number
RG59 non-plenum cable	22-145-xx
RG59 plenum cable	22-146-xx
RG6 BNC cable	26-383-xx

Mounting the Codec

CAUTION: Installation and service must be performed by authorized personnel only.

The 1-inch high, half rack width VNC 325 can be placed on a table, mounted in a rack, or mounted under a desk or table.

Tabletop Use

Affix the included rubber feet to the bottom of the unit and place it in any convenient location.

Mounting kits

Mount the unit using any of the mounting kits listed above, in accordance with the directions included with the kit.

UL Rack-Mounting Guidelines

The following Underwriters Laboratories (UL) requirements pertain to the installation of the unit into a rack.

- **Elevated operating ambient temperature** — If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consider installing the equipment in an environment compatible with the maximum ambient temperature ($T_{ma} = +95\text{ }^{\circ}\text{F}$, $+35\text{ }^{\circ}\text{C}$) specified by Extron.
- **Reduced air flow** — Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.
- **Mechanical loading** — Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.
- **Circuit overloading** — Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
- **Reliable earthing (grounding)** — Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (such as use of power strips).

Test Pattern

Pressing and holding the front panel Test button and selecting the network interface test mode display the test pattern on the SDI OUT connector.

Output format:	HD	1280 x 720, progressive
	SD	720 x 576 or 720 x 480, interlaced

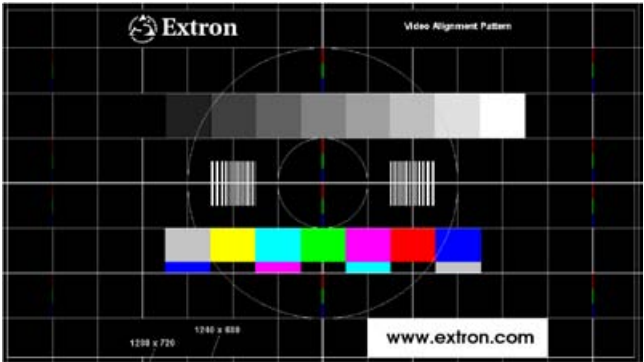


Figure 53. High Definition Test Pattern:
1280 x 720

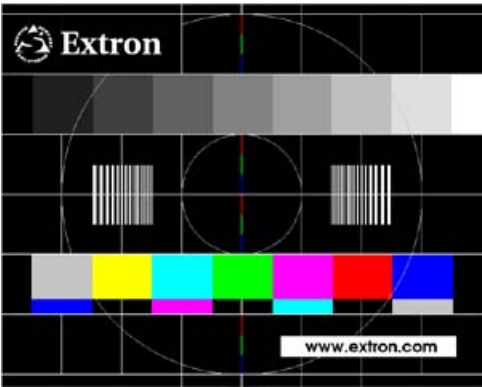


Figure 54. Standard Definition Test Pattern:
720x480, 720x576

Extron Warranty

Extron Electronics warrants this product against defects in materials and workmanship for a period of three years from the date of purchase. In the event of malfunction during the warranty period attributable directly to faulty workmanship and/or materials, Extron Electronics will, at its option, repair or replace said products or components, to whatever extent it shall deem necessary to restore said product to proper operating condition, provided that it is returned within the warranty period, with proof of purchase and description of malfunction to:

USA, Canada, South America, and Central America:

Extron Electronics
1001 East Ball Road
Anaheim, CA 92805
U.S.A.

Japan:

Extron Electronics, Japan
Kyodo Building, 16 Ichibancho
Chiyoda-ku, Tokyo 102-0082
Japan

Europe, Africa, and the Middle East:

Extron Europe
Hanzeboulevard 10
3825 PH Amersfoort
The Netherlands

China:

Extron China
686 Ronghua Road
Songjiang District
Shanghai 201611
China

Asia:

Extron Asia
135 Joo Seng Road, #04-01
PM Industrial Bldg.
Singapore 368363
Singapore

Middle East:

Extron Middle East
Dubai Airport Free Zone
F12, PO Box 293666
United Arab Emirates, Dubai

This Limited Warranty does not apply if the fault has been caused by misuse, improper handling care, electrical or mechanical abuse, abnormal operating conditions, or modifications were made to the product that were not authorized by Extron.

NOTE: If a product is defective, please call Extron and ask for an Application Engineer to receive an RA (Return Authorization) number. This will begin the repair process.

USA: (714) 491-1500

Asia: 65.6383.4400

Europe: 31.33.453.4040

Japan: 81.3.3511.7655

Units must be returned insured, with shipping charges prepaid. If not insured, you assume the risk of loss or damage during shipment. Returned units must include the serial number and a description of the problem, as well as the name of the person to contact in case there are any questions.

Extron Electronics makes no further warranties either expressed or implied with respect to the product and its quality, performance, merchantability, or fitness for any particular use. In no event will Extron Electronics be liable for direct, indirect, or consequential damages resulting from any defect in this product even if Extron Electronics has been advised of such damage.

Please note that laws vary from state to state and country to country, and that some provisions of this warranty may not apply to you.

Extron USA - West Headquarters	Extron USA - East	Extron Europe	Extron Asia	Extron Japan	Extron China	Extron Middle East	Extron Korea	Extron India
+800.633.9876 Inside USA/Canada Only	+800.633.9876 Inside USA/Canada Only	+800.3987.6673 Inside Europe Only	+800.7339.8766 Inside Asia Only	+81.3.3511.7655 FAX: +81.3.3511.7656	+4000.EXTRON +4000.398766 Inside China Only	+971.4.2991800 FAX: +971.4.2991880	+82.2.3444.1571 Fax: +82.2.3444.1575	1800.3070.3777 Inside India Only
+1.714.491.1500 FAX: +1.714.491.1517	+1.919.863.1794 FAX: +1.919.863.1797	+31.33.453.4040 FAX: +31.33.453.4050	+65.6383.4400 FAX: +65.6383.4664		+86.21.3760.1568 FAX: +86.21.3760.1566			+91-80-3055.3777 Fax: +91 80 3055 3737